

NETWORK WORLD

THE WEEKLY FOR LEADING USERS OF COMMUNICATIONS PRODUCTS & SERVICES

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► DECNETS

DEC struts stuff at DECWorld '87

BY PAUL KORZENIOWSKI
Senior Editor

BOSTON — At a sprawling exposition here designed to impress its largest customers, Digital Equipment Corp. last week sounded the networking theme, introducing a new generation of its Digital Network Architecture and a variety of communications products.

Also announced at DECWorld '87 — which was spread out over seven area hotels, a conference center and two ocean liners, including the Queen Elizabeth II — was Ethernet support over twisted-pair wire (see "DEC, 3Com offer E-net over twisted-pair wire," NW, page 2).

The exposition, expected to attract more than 27,000 customers, was used to reaffirm DEC's earlier commitment to support the International Standards Organization's Open System Interconnect (OSI) model. The firm also strengthened the links between DECnet and IBM

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► MFJ MODIFICATIONS

Greene snuffs RBHC hopes for freedom

Says no deal on long distance, manufacturing.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — U.S. District Court Judge Harold Greene last week released a long-awaited ruling on changes to the Modified Final Judgment, saying the regional Bell holding companies will continue to be barred from long-distance services and manufacturing but giving them freedom to enter nontelephone businesses without permission.

Removal of the nontelecommunications business restriction will allow the RBHCs to enter any nontelephone business without first obtaining a waiver from Greene,

as was previously required.

Greene also said the RBHCs are free to provide transmission facilities for information service providers, but still prohibited them from offering such services.

Greene's order marked the culmination of the triennial review of the Modified Final Judgment, which was required when the decree came down from the court in 1982. The order dealt a resounding blow to RBHC hopes for freedom from the rules that have governed their activities since the breakup of the Bell System.

In a carefully crafted 223-page order, Greene concluded that RBHC control over

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OPEN SYSTEMS: HOW OPEN ARE THEY?

Data General: out to make money the connectivity way

BY JULIA KING
Special to Network World

Data General Corp. is out to make money. And the best way to do that, the company has concluded, is to communicate with its rivals. To this end, DG has renewed its commitment to open systems

and set out on an aggressive course to develop and deliver communications products that allow the company's systems to operate in a multivendor environment.

In June, DG announced that it would abandon its proprietary Xodiac Networking Architecture and migrate to full

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► SERVICE UPDATE

Virtual nets win high user praise

BY BOB WALLACE
Senior Editor

Users of virtual network services offered by the three major long-distance carriers said the services have met or exceeded their expectations and have provided significant cost savings.

As a result, all users interviewed said they plan to expand their use of the services.

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NETWORK LINE

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► Comsat General and Timeplex join to form Safe-com, a provider of T-1 satellite services at 25% below most carrier rates. Page 2.

► Weyerhaeuser plans to rack up big savings using new distributed application software that off-loads mainframe tasks to PCs. Page 2.

► AT&T says it will drop its Accunet T1.5 M-24 multiplexing charge, a move that could save users \$10,000 per circuit annually. Page 4.

Features

► Software that plots cheap routes for data/voice transmission may be the answer to a net manager's prayers, but the two products studied in this week's review are something short of miraculous. Page 47.

► IBM NETWORKS

User builds 9370 network

Tcom goes on-line with nationwide SNA net.

BY JOSH GONZE
Staff Writer

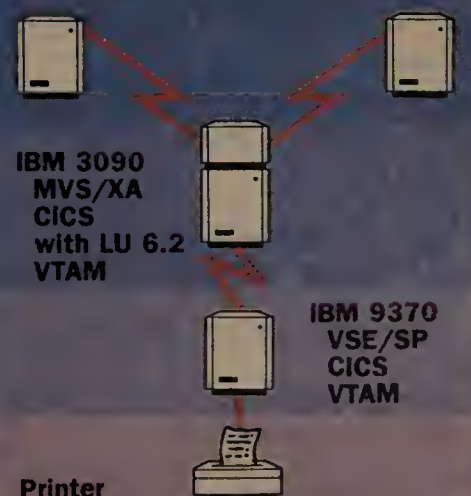
WASHINGTON, D.C. — After beta tests confirmed the communications capabilities of IBM's 9370, Tcom Systems, Inc. has cut over one of the first SNA networks based almost exclusively on the versatile minicomputer.

Tcom, founded last year by former U.S. Postmaster General William Bolger, is using 9370s housed at 25 printing facilities nationwide to provide mass mailing services. The 9370s are linked in a star configuration to an IBM mainframe at a central site in Tampa, Fla. The network went live Sept. 1, after beta tests conducted by GTE Data Services, Inc. showed the minicomputer worked smoothly in a network.

In April, Tcom, based here, awarded GTE Data Services a \$50 million contract for design and implementation of the network. GTE Data Services is

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Tcom's 9370 net delivers the mail



Mass-mail print jobs are distributed from Tampa, Fla., to 25 printing sites around the country.

► DECWORLD '87

DEC, 3Com offer E-net over twisted-pair wire

BY MARY PETROSKY
West Coast Correspondent

BOSTON — After more than a year of codevelopment, Digital Equipment Corp. and 3Com Corp. last week announced products that support Ethernet using nonshielded twisted-pair telephone-type wire.

Executives from both companies recommended use of twisted-pair wire to augment other types of wire, including coaxial cable, rather than replacing them. DEC is continuing to encourage customers to use ThinWire Ethernet for new construction because it believes the cable is most reliable and cost-effective.

"Coax is so much easier, but a

number of our customers put twisted pair in their buildings and they're too embarrassed to take it out, so we've adopted Ethernet on twisted pair," joked DEC President Ken Olsen during the company's announcement at DECWorld '87.

"It's a truly magnificent technical achievement, but that doesn't mean it's the best choice," Olsen added. "Twisted pair costs more, it's awkward, and it has limitations. But for those people who need it, it's exceedingly important. And if you're committed to it, we have the answer."

Although twisted-pair wire itself is cheaper than even thin coaxial cable, the electronics needed to drive data at 10M bit/sec over telephone-type wire make it more

expensive than coaxial cable, according to J. Scott Haugdahl, senior communications engineer at Architecture Technology Corp., a communications consulting and publishing firm. "Eventually, I think they will incorporate support of twisted pair into network interface boards, and then the costs will be comparable," Haugdahl said.

3Com approached DEC with an initial design for Ethernet over twisted pair in the spring of 1986, according to Bob Metcalfe, 3Com's founder and current senior vice-president of technology. Although the companies worked together and have cross-licensed each other's technology, DEC and 3Com have come up with slightly different products, Metcalfe said.

DEC's Unshielded Twisted-Pair Ethernet Adapter (UTPEA) is a pair of adapters that can be used with most installed telephone wiring. One adapter is used to connect a workstation to the twisted-pair

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► SATELLITE SERVICES

Safecom offers T-1 backup

Comsat, Timeplex in joint venture.

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — Comsat General Corp. and Timeplex, Inc. last week announced the formation of a joint venture called Safecom Partners to provide T-1 satellite service to large private network users at rates 25% below current carrier rates.

The Safecom T-1 services will initially be offered for backup, overflow and alternate routing of T-1 network applications, but the company eventually may offer more traditional services, said Timeplex spokesman Anthony Squeglia. Safecom plans to begin offering service in January 1988.

The primary customer base for the Rochelle Park, N.J.-based Safecom will be Timeplex's private network customers. "Users need to keep information flowing between network nodes, and for some critical applications, network downtime can mean the loss of millions of dollars each hour," said Safecom General Manager Ben Ryan. "With Safecom, users have a low-cost opportunity to add the transmission redundancy their networks demand," Ryan said.

Comsat General will own 49% of the start-up and Timeplex will own 51%. Timeplex will be the managing partner, contributing \$7 million in financing for earth stations, marketing and personnel. Comsat General will contribute its currently idle Comstar D2 and D4 satellites but will not provide financing or personnel, said Comsat spokesman Richard McGraw.

Washington, D.C.-based Comsat General provides satellite transmission services for voice, data and video communications. Its parent, Communications Satellite Corp., is the U.S. signatory in the International Satellite Consortium. Timeplex, of Woodcliff, N.J., provides T-1 multiplexers and other voice and data communications equipment and services to business customers.

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► PC-TO-MAINFRAME

Beta user lauds distributed software

BY MARY LINEHAN
Staff Writer

TACOMA, Wash. — A top financial executive at Weyerhaeuser Co. said he expects to reduce some data processing charges by as much as 75% thanks to new distributed application software that off-loads mainframe tasks to microcomputers.

Weyerhaeuser is currently beta testing McCormack & Dodge Corp.'s recently introduced AP:Satellite ("PC-to-CPU software debuts," NW, Sept. 7), which allows users to process accounting trans-

actions on personal computer workstations and then transmit their work to the mainframe for consolidation. Mainframe information can also be downloaded for use on the microcomputers. AP:Satellite works with McCormack & Dodge's Interactive PC Link micro-to-mainframe link and AP:Millennium, the company's mainframe accounts payable system.

Bill Musser, manager of Weyerhaeuser's accounts payable department, said AP:Satellite will cut the amount his department is charged by corporate MIS for IBM CICS services.

"Our CICS costs are about \$18,000 a week, and I expect to knock about 75% off that as a result of AP:Satellite," Musser said. Musser noted the department will still incur other computer charges, despite the savings realized by reducing CICS transaction traffic.

"We're extremely pleased with the product," Musser said. "By using AP:Satellite, people are able to work as if they are on-line with the mainframe. Not only do we save on costs by off-loading [transactions from] the mainframe, but problems can be discovered immediately, rather than waiting to send everything to the mainframe."

Currently, Weyerhaeuser is running AP:Satellite on an IBM Personal Computer XT and a Compaq Computer Corp. 286 Deskpro personal computer linked to an IBM 3085J mainframe. Musser said he expects to run the package on as many as eight personal computers by the conclusion of the beta test.

AP:Satellite lets end users enter and validate invoice transactions according to the mainframe editing criteria. Users can inquire into invoice and vendor activity from mainframe data bases and print vendor, invoice, tax and general

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link remote mainframes to central facilities. **Page 15.**

LOCAL NETWORKING

Florida telco GTE plans to expand the local networks serving its operations and administration to support up to 6,000 nodes. **Page 17.**

COMMUNICATIONS MANAGER

Keith Nichols tells how networking helped Wickes Companies, a diversified conglomerate, dig out from bankruptcy. **Page 19.**

NEW PRODUCTS AND SERVICES

AT&T unveils communications enhancements for its family of IBM 3270 plug-compatible products, the 6500 Multifunction Communication System. **Page 23.**

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TELECOM TRENDS

Marketing experts from Rolm and Intecom offer strategies to telecom managers who need to sell top management on voice-messaging systems. **Page 11.**

DATA DELIVERY/NET MANAGEMENT

Some large users are adopting channel extenders, which attach directly to mainframe channels, to

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► **COST CUTS**

AT&T dumps Accunet T-1 multiplexer fee

Move could save users \$10,000 per line.

BY KARYL SCOTT

Washington, D.C. Correspondent

WASHINGTON, D.C. — AT&T recently proposed eliminating the M-24 multiplexing charge currently associated with Accunet T1.5 service, a change expected to save some T-1 customers an estimated \$10,000 per circuit annually.

Elimination of the M-24 charge applies only to customers who use T-1 facilities to access Megacom, Megacom 800, Software-Defined Network (SDN) or Accunet Switched 56K services. Customers who multiplex a combination of these services over a single T-1 link will still be charged for M-24, according to AT&T's recent tariff filing with the Federal Communications Commission.

The M-24 function is provided today using D4 channel banks to demultiplex T-1 1.544M bit/sec digital links into 24 analog voice or data circuits and to pass them to an AT&T 4ESS central office switch. The 4ESS can then route the 24 circuits individually,

whether they are Megacom, Megacom 800, SDN or Switched 56K Service calls.

With the elimination of the M-24 option, traffic will be sent directly to the 4ESS, which will perform the demultiplexing and digital-to-analog conversion, according to Accunet Product Marketing Manager Victoria Wright.

Chuck Askine, telecommunications analyst at T. Rowe Price Associates, an investment firm in Baltimore, said this change will have a direct effect on his communications costs. T. Rowe uses a T-1 link to access Megacom and two T-1s for Megacom 800. "This is good news," Askine said. "I've been trying to get AT&T to eliminate this charge but was told it was part of the tariff and there was nothing I could do but pay it."

According to tariff analyst Robert Ellis of The Aries Group, Inc. in Rockville, Md., AT&T decided to eliminate the charge largely as a result of customer complaints.

"It didn't make much technical sense to charge customers a sepa-

rate multiplexing fee for something the switch was capable of doing," Ellis said.

The elimination of the M-24 charge will save users \$806 per month for each T-1 circuit. Current M-24 users pay \$289 per month for multiplexing, a \$5.15 monthly per port charge for each of the 24 circuits in the T-1 and a \$16.40 monthly charge for each of the 24 voice grade connections.

The M-24 charge will be eliminated for customers who notify AT&T by Sept. 16 that they wish the M-24 option to be canceled. Customers who notify AT&T after Sept. 16 will have to pay a \$99 service charge, Wright said.

"The option to connect 1.5M bit/sec services directly to Megacom, Megacom 800, SDN and Switched 56K bit/sec services [without using M-24] is being offered to meet the needs of customers who are increasingly using 1.5M bit/sec facilities in connection with these other services," the AT&T filing said.

Wright said AT&T was able to eliminate the charge because it has "gained more knowledge in how to provide DS-1 (T-1) service." The elimination of the M-24 charge is not the result of a new technology, Wright said.

"The 4ESS always had the software capability to multiplex T-1 traffic," he said. "It's not as if AT&T suddenly developed new

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► **STATE NETWORKS**

Illinois drafts integrated net plan

BY MICHAEL FAHEY

Senior Writer

SPRINGFIELD, Ill. — The State of Illinois is expected this week to issue a request for proposal for a statewide digital backbone network that will support voice, data and video transmission services while dramatically reducing communications costs.

The new network, which is expected to cost more than \$150 million, will support some 40,000 data terminals and more than 130,000 voice communications users at offices throughout Illinois' 19 local access and transport areas.

Currently, Illinois state government users make more than 1.8 million long-distance calls per month, and the state's annual telecommunications expenses are more than \$105 million. State officials expect the new network to save Illinois taxpayers \$60 million in reduced long-distance costs over the next five years.

To provide potential vendors with as much flexibility as possible in meeting the state government's communications needs, Illinois officials have not outlined many hard and fast criteria for the new network.

Instead, vendors will be encouraged to be creative in drawing up proposals to supply a high-capacity network capable of carrying voice and data as well as both broadcast- and conference-quality

video transmission, according to Charles Miller, chief of the communications services division of the state's central management services agency. Miller said it is possible the contract will be expanded to include new phone systems for state offices here at the capital and in Chicago.

"We are looking for a lot of creativity from the vendors. We will allow them to bid on the Springfield and Chicago systems, and in fact, any other systems in the state," Miller said. State facilities in Chicago and Springfield currently use Centrex services provided by Illinois Bell. In addition, the Illinois state government has some 300 private branch exchanges throughout the state.

"We've pretty much determined that our needs will require T-1 and T-3 service," Miller said.

According to Jeff Held of Network Strategies, Inc., the Fairfax, Va., consulting company that is advising the state of Illinois on the project, the network is likely to require about 100 T-1 circuits as well as some T-3 circuits.

In addition, the vendor that wins the contract will be expected to deliver a network management system that will allow the state to identify problems and reconfigure the network to meet changing user needs.

One requirement the state has posed is that the new network use the same dialing scheme as the

public switched network. This will simplify dialing procedures on the state network and allow alternate routing of calls from the state to the public switched network.

Otherwise, Miller said, "We are leaving the process wide open for vendor proposals."

According to Miller, the state is expecting between 20 and 30 proposals for the new network. Vendors are being encouraged to team up to meet the state's needs, he said. Systems integrators Boeing Computer Services Co. and Electronic Data Systems Corp. (EDS) have expressed interest in the project, Miller said. Neither EDS nor Boeing could be reached for comment.

The state formerly relied primarily on AT&T's Telpac, a bulk discount service from AT&T that was detariffed in the state two years ago. Illinois currently uses US Sprint Communications Co. and Williams Telecommunications Co. T-1 facilities to carry voice and data traffic between Springfield and Chicago.

The state began working on the backbone network plan in January 1987, Miller said. At that time, an advisory panel of state users and representatives from the private sector was formed to study the state's communications needs. A group of 12 vendors including IBM, AT&T, Digital Equipment Corp., Illinois Bell and US Sprint made presentations to the panel. □

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► **QUARTERLY REPORTS****Novell, 3Com prosper****BY JOSH GONZE**
Staff Writer

Novell, Inc. and 3Com Corp., two leading microcomputer local network vendors, last week reported quarterly revenue growth of 87% and 66%, respectively, figures the companies attributed to strong market demand and solid product lines.

3Com announced that revenue for its first fiscal quarter, which ended Aug. 31, was up 66% to \$33.1 million. Novell's 87% growth for its third fiscal quarter, which ended Aug. 1, brought revenue to \$48.7 million. The figures are in comparison to the corresponding quarter last year.

Novell's net income for the quarter was \$5.27 million, or 20 cents per share, an increase of 86% from the similar period last year. 3Com did not provide income figures but

said earnings per share for the quarter were 22 cents, up 57% from the previous year's quarter.

Novell's President and Chief Executive Officer Raymond Noorda commented on the strong market for local networking products, saying, "We believe this represents a growing interest in local-area networking in general and in Novell's NetWare products."

Analysts who follow the local network market said not all vendors are doing as well as Novell and 3Com. "These two companies, and maybe a couple of others, are

the only ones doing this well," said Eric Killorin, publisher of "Netline," an industry newsletter on computer networks.

"There are two reasons they're doing well: First, they have very strong management, and, second, they have consistently been announcing higher performance products that build on their current product base," he said.

In addition, 3Com and Novell have done well by focusing on the fast-growing personal computer segment of the local network business, said Brad Baldwin, an analyst at Dataquest, Inc. "[That focus] explains why so many of the larger vendors, companies that used to be called general-purpose LAN vendors, are getting involved

with PC LANs now," he said.

3Com spokeswoman Margaret Epperheimer credited high sales of the company's network operating system for much of the overall revenue jump. "The strong financial results are attributed to the momentum growing for our 3+ network operating software," she said. Epperheimer also attributed 3Com's announcement in early August of a 3+ extension called 3+ For The Macintosh with part of the high interest in the software.

Buyers of the 3+ software include both new customers and the company's current users, she said.

Dataquest forecasts a 34% compound annual growth rate for the personal computer local network market through 1991. ▢

► **LOCAL NETWORKING****Twisted-pair Arcnet unveiled****BY MARY PETROSKY**
West Coast Correspondent

HAUPPAUGE, N.Y. — Responding to growing demand, Standard Microsystems Corp. has introduced a family of Arcnet local net products that use twisted-pair wiring.

The new products include an Arcnet network controller board, the Arcnet PC250, which fits into an IBM Personal Computer or compatible, a Twisted Pair Repeater and a Twisted Pair Link. The repeater is used to connect segments of twisted-pair wiring and the link connects a segment of twisted-pair wiring to a segment of coaxial cabling. The repeater and the link each have two ports.

The company recommends that customers install new twisted-pair wiring — solid copper, 22- or 24-gauge wire — for use with the new products, according to Carol Tucker, principal marketing specialist. But, she added, the company is testing the new products for use with existing installed wiring.

"We developed Arcnet on twisted pair because there was such a demand for it," Tucker said. She said the medium can be less expensive and easier to install than other types of wiring, but users must choose cabling with specific attenuation, impedance and number of twists per foot.

Segments of twisted-pair wiring can be a maximum of 400 ft, with up to 10 personal computers linked per segment via T connectors. The Arcnet PC250 controller is priced at \$295. The Twisted Pair Repeater and the Twisted Pair Link are each \$375. ▢

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RBHCs free to enter businesses

continued from page 1

local markets had not loosened enough to warrant greater latitude for the carriers. He wrote, "No significant changes have occurred with respect to the core MFJ restrictions — long-distance, manufacturing and the sale of information services — that would justify a radical change in the decree."

Greene said he retained the manufacturing, long-distance and a portion of the information service restrictions because "the RBHCs have the same incentives to discriminate, manipulate and cross-subsidize as the Bell System had before the breakup."

"For 30 years, Congress, the courts and the FCC have wrestled with the problem of what to do about the Bell System monopoly, its arrogance in dealing with competitors and consumers and its power to shut out competition," Greene wrote. "Had it not been for the drumbeat of a wide-ranging [RBHC] public relations campaign, no one would have seriously entertained the proposition that a solu-

tion to the 30-year [AT&T anti-trust] struggle should be jettisoned after a mere three years, particularly when the changes that have occurred are insignificant."

The RBHCs and Federal Communications Commission Chairman Dennis Patrick spoke out strongly against Greene's decision, but users were generally pleased with its preservation of Modified Final Judgment safeguards, as were long-distance carriers AT&T and MCI Telecommunications Corp.

Patrick said, "I am very disappointed with Judge Greene's decision. I continue to believe that the development of competition since divestiture and the creation of regulatory safeguards justify the removal of the MFJ restrictions. Regulatory safeguards should be sufficient to protect consumers and competitors from any significant threat of anticompetitive conduct by the RBHCs."

Bell Atlantic Corp. Chairman Thomas E. Bolger said, "The court has cast a vote against competition

in the telecommunications industry. The real losers are the American consumers and businesses, who will not enjoy the competitive prices and innovative services that competition brings."

But James Blaszk, attorney for the Ad Hoc Telecommunications Users Committee, disagreed. "Judge Greene's decision recognizes that the RBHCs still have the potential to abuse their monopoly power to impede competition and cause prices to be higher than they should be."

Charles Marshall, vice-chairman of AT&T, said, "The judge's decision appears to assure continued stability for the industry and the customers it serves, at the same time providing additional freedom to the RBHCs."

The RBHCs were disappointed that Greene lifted only a portion of the current information services restriction. The RBHCs may "construct and operate the network infrastructure that will make possible transmission of information services originated by others," Greene's order said. But the RBHCs will not be allowed to provide in-

formation services.

William Adler, Pacific Telesis Group's executive director of regulatory affairs, said his firm is likely to appeal Greene's decision. "We didn't get anything worth having. The court's decision is contrary to the findings and policy of the FCC."

Greene found that the RBHC's local exchange monopolies continue to thrive.

"The Justice Department's own expert [Peter Huber] found that these bottleneck monopolies are still so pervasive that only one in one million users is able to bypass the RBHCs, while the rest remain dependent on the RBHCs for local connections," Greene wrote.

During the triennial review, Huber, the Department of Justice's special consultant, issued a year-long study of competition in the telecommunications industry. Based on Huber's findings, the Department recommended the RBHCs be given conditional freedom to enter the long-distance market and full freedom to manufacture telecommunications equipment and market information services. □

DEC struts stuff at DECWorld '87

continued from page 1

products and added important networking features users need to install corporatewide networks that many competitive products lack.

Vince Barrett, vice-president at Gartner Group, Inc., a market research firm in Stamford, Conn., said, "[Systems Network Architecture] is the de facto enterprise networking standard, and it would be difficult for any other model to displace it. By raising the OSI flag and providing exceptional IBM connectivity, DEC is presenting a convincing case for companies thinking about making DECnet their enterprisewide networking standard."

The event was used to launch Phase V of the Digital Network Architecture, to be embodied in DECnet/OSI Phase V products. DECnet V will be "compatible with existing DECnet installations and, at the same time, will provide MIS managers with an easy transition to OSI standards," the company said.

The announcement affirmed a commitment to OSI the company first made in July 1985, when it promised to migrate its current proprietary network architecture to OSI.

Although no new products or services were introduced, the company said the fifth generation architecture will, over time, provide DECnet users with full compliance with OSI. William R. Johnson, vice-president of distributed systems at DEC, said OSI conformance will take two or three years.

According to Kim Myhre, vice-president of communications research at International Data Corp., a market research firm in Framingham, Mass., who attended an analyst briefing at the conference, "DECnet Phase V is DEC's promise

to make every attempt to incorporate OSI in DECnet where possible and appropriate. This counters IBM's commitment to provide gateways to OSI."

If fully realized, DECnet Phase V will position DEC with an attractive alternative to other network architectures. "Phase V will establish DECnet as the de jure OSI alternative to SNA for multivendor networking," said David L. Terrie, an independent consultant and editor of a monthly newsletter, "Patricia Seybold's Network Monitor."

The commitment does not mean that DECnet will be functionally equivalent to OSI. According to Gartner Group's Barrett, DEC views OSI as a subset of DECnet. "OSI support will be more in terms of interfaces than implementations of a universal protocol stack that every vendor will use solely for its network model," Barrett said.

DEC President Ken Olsen depicted industry standards as stable platforms on which vendors can build to differentiate their prod-

ucts.

"Standards evolve slowly and require tedious work," Olsen said. "Most of the interesting work in the network area has been and will continue to be done with proprietary products."

Products announced at the show included an enhancement to Mailbus, an application that links DEC's All-In-1 users with various electronic-mail systems, including IBM's SNA Distribution Services and DISOSS.

DEC also committed to adding gateways for Mailbus to Ultrix, its implementation of Unix, and to IBM's Professional Office System E-mail system. Mailbus runs on a VAX or MicroVAX computer and requires DECnet software. The link to DISOSS will be available in November.

DEC also unveiled three products that make it easier for users to access information on corporatewide DECnet networks. In order to access a file on many networks, a user has to know not only the

name of a file but also the name of the machine on which the file is stored.

To help overcome that limitation, DEC introduced the VAX Distributed Name Service, communications software that ensures a consistent networkwide naming convention for network resources. Prices for the software range from \$600 to \$14,400.

DEC also released VAX Distributed File Service, communications software that enables users to access a file without knowing where it is stored. Prices for the software range from \$250 to \$3,600.

The third product, Distributed Queuing Service, is meant to enable customers to send print requests to remote printers, view the status of a request and delete requests from a print queue. The product requires VMS operating system 4.4 and DECnet-VAX. Prices for Distributed Queuing Service range from \$250 to \$3,000. All three products will be available next month. □

Safecom

continued from page 2

The Comstar satellites will be accessed using nine existing earth stations Timeplex plans to buy from bankrupt carrier Argo Communications Corp. Customers will be linked to these earth stations using terrestrial T-1 facilities. The earth stations are located in Atlanta, Chicago, Detroit, Houston, Los Angeles, Miami, New York, San Francisco and Seattle.

Safecom service will be limited to these geographic areas, where it will employ a direct sales force. The company may expand to other major cities, Squeglia said.

Richard Malone, a principal in the communications consulting firm Vertical Systems Group in Dedham, Mass., said the venture

"is a positive move for both companies. It places Timeplex in a whole new market and enables it to offer one-stop shopping to customers — from equipment to transmission. I wouldn't be surprised if, somewhere down the road, Safecom begins bundling prices for equipment and transmission. That would certainly give them a leg up on the competition," Malone said.

Telecommunications-watcher George Dellinger of the Washington Analysis Corp. in Washington, D.C., said, "I can't see this as anything but positive for Comsat. They don't have any tenants for the Comstar [satellites], and this will allow them to extract some revenue from the satellites that would otherwise go unused."

Comsat General President Joel

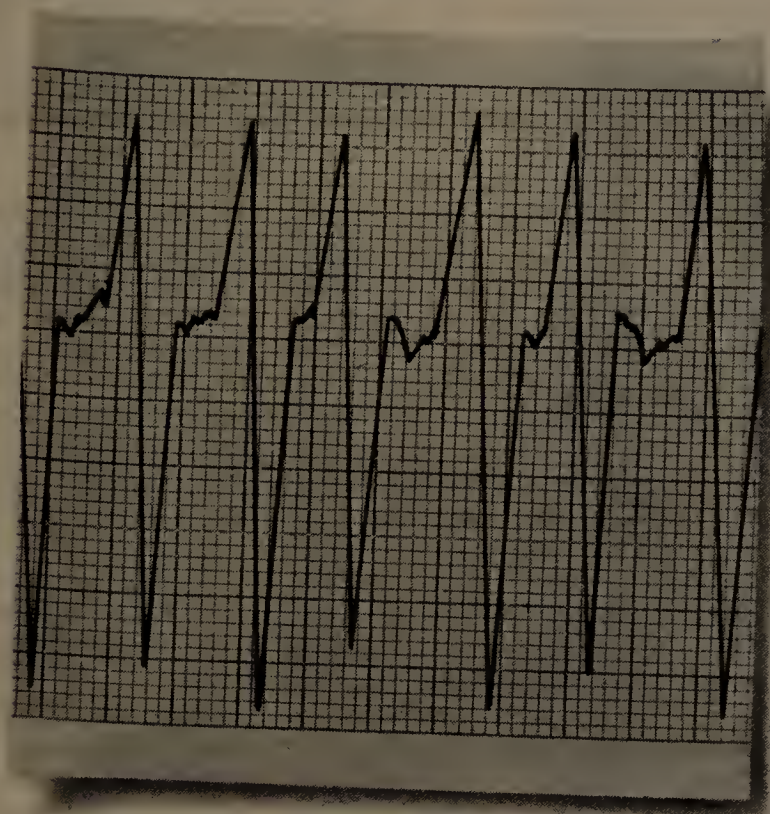
Alper said, "The Comstar satellites are fully depreciated, which makes our investment cost minimal. These savings will be passed on to Safecom customers" in the form of lower rates.

"Comsat and Timeplex were able to put together a T-1 network using existing equipment at 10% of the cost usually associated with a project of this sort," Squeglia said. "The economics were just too good to pass up a deal like this."

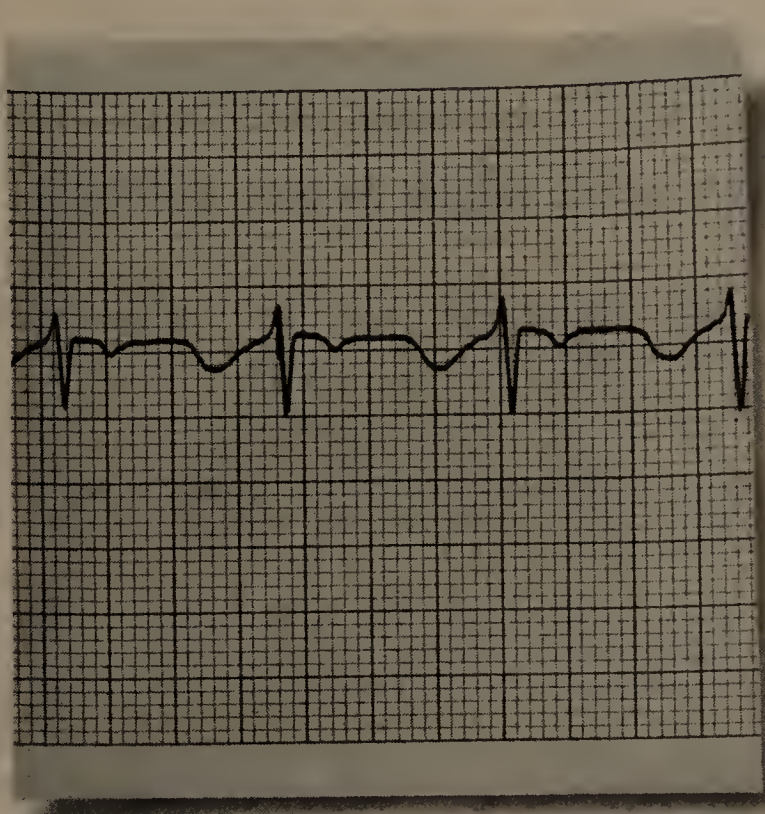
"We're bringing together assets that separately had limited value but put together as a network have compelling value," said Timeplex President Edward Botwinick.

The Federal Communications Commission must approve the transfer of the Comstar licenses to Safecom. No date has been set for an FCC decision. □

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COMMUNICATIONS
SERVICES VIA **ITT**

DEC, 3Com offer Ethernet

continued from page 2

wire, and the other is required at the far end of the wire in the wiring closet. Twisted-pair cable runs can be up to 50 to 70 meters.

In the wiring closet, the adapter provides a coaxial cable output for attachment to a DEC Ethernet multiport repeater, an existing product that provides a connection to a coaxial Ethernet backbone.

The UTPEA products have been tested with DEC's DEPCA Ethernet controller, which is a network interface for the IBM Personal Computer, and with the DELUA and DELQA Ethernet controllers, which are board products that provide Ethernet interfaces for the VAXmate, VS2000 and other DEC computers.

A complete eight-station UTPEA starter kit is priced at \$1,600.

3Com's system consists of two components, the PairTamer adapt-

er and a repeater called MultiConnect. The product line also includes LanScanner, a tool for assessing the suitability of installed wiring for Ethernet transmission. 3Com's products can be used with the AT&T Premises Distribution System, the IBM Cabling System and older telephone wiring.

Thin coaxial cable coming out of an Ethernet workstation is used to connect to the PairTamer, which in turn is tied to one pair of unused twisted-pair wires in a typical telephone wiring bundle. A second PairTamer is placed in front of the MultiConnect repeater, which will typically be located in a remote wiring closet.

MultiConnect repeaters are used to connect wiring centers or to tie a cluster of users to an Ethernet backbone. One repeater contains slots for 15 modules and supports any combination of coaxial, fiber-optic and twisted-pair wiring.

3Com is supplying two types of modules, a thin coaxial cable con-

nection for \$230 and a thick coaxial cable connection, priced at \$175.

Users can install up to 45 modules by adding two MultiConnect expansion units. Each MultiConnect expansion unit is \$1,095. The PairTamer set is priced at \$325.

Maximum cable runs vary in the 3Com scheme because of the use of coaxial cable to run from the PairTamer to the workstation. A user could reach the maximum permissible distance using a 50-ft run of twisted-pair wire and a 700-ft run of coaxial cable. The more twisted-pair wire used, the shorter the distance spanned. If 250 feet of twisted pair is used, only 20 additional feet of coaxial can be employed.

The LanScanner is a hand-held, battery-powered testing instrument for measuring wire characteristics. It costs \$995.

DEC expects to begin shipments of its adapter in January 1988. 3Com's products will be available this December through specially authorized U.S.-based resellers. □

AT&T dumps mux fee

continued from page 4

software that allows the central office switch to perform this."

James Maretz, senior network engineer at the Cigna Corp. insurance company in Voorhees, N.J., said this pricing change would not affect his company because they were not using T-1 links to access Megacom or SDN, but if they decided to do so at some later date, this new option could make those services more attractive.

"The primary beneficiaries of this pricing change are the Megacom and private network customers who use T-1 to interconnect their electronic tandem networks with SDN facilities," Ellis said.

AT&T expects to lose \$12.9 million in M-24 revenue as a result of this change but expects to make up that loss from increased demand for Accunet T-1, Megacom, Megacom 800 and SDN services. □

Virtual nets win high user praise

continued from page 1

In addition, users of AT&T's Software-Defined Network (SDN) service, MCI Communications Corp.'s VNET and US Sprint Communications Co.'s Virtual Private Network (VPN), told *Network World* the sound quality of these services is superior the WATS, satellite and switched network services they formerly used.

While appraisals of the virtual network services were generally positive, several users complained that billing continues to be a problem. Bills are often late, incomplete, incorrect or difficult to understand, they maintain. Most of the users said they are working with carriers to iron out the problems.

Virtual nets enable customers to use dial-up facilities to extend private network-like functions to geographically dispersed company sites that cannot otherwise justify the cost of leased lines.

Virtual networks are created in the memories of carrier network switches by programming in call-routing data.

By opting for a virtual network, a user can avoid the cost of leasing or purchasing network switching equipment and dedicated transmission facilities between network nodes.

Transamerica Information Services, a subsidiary of Transamerica Corp., replaced its aging AT&T Enhanced Private-Switched Communications Service (EPSCS) with AT&T's SDN in May 1986. "We rate a service for quality and cost," explained John Lamore, voice communications manager for the firm. "We would have to give AT&T an A plus in both categories."

In addition to EPSCS, Transamerica had used terrestrial circuits provided by AT&T, MCI and US Sprint, as well as using satellite circuits.

"We usually heard only complaints from end users," Lamore

said. "We had a very high level of frustration and dissatisfaction with this mix. End users were calling up and telling us to dump our voice network. After our 80-location SDN became operational, these same end users began calling us to tell us they thought SDN was a fantastic service."

Spurred by AT&T's mid-July introduction of SDN rate cuts and a dial-up access option for the service, Transamerica is contemplating adding as many as 200 sites to its current 80-site virtual network (see "AT&T cuts SDN rates, offers dial-up access," *NW*, July 20).

This option enables SDN users to justify the addition of smaller company locations to a virtual network by removing the requirement to use dedicated facilities to access AT&T nodes. Once within the AT&T network, the traffic is carried on switched facilities.

Westinghouse Corp. in Pittsburgh, which relies on a 205-site MCI VNET to carry 40% of its domestic voice communications traffic, said end-user response to the service surprised the company's telecommunications staffers. "The quality of the service is excellent," remarked Dave Edison, corporate information and communications department manager for the \$10.7 billion electrical component manufacturer.

"I've been receiving warm letters and positive comments from VNET end users about the service," Edison said. "Usually, the changes we make aren't noticeable to end users. We'll replace one vendor's service with another's to save a few bucks, and end users aren't affected. With VNET, end users claim they have noticed a major increase in the quality of the telephone service," he said.

Tom O'Toole, telecommunications manager for Westinghouse, said the company is contemplating adding several smaller locations to VNET in the next year.

One user, Hercules, Inc., a Wilmington, Del.-based chemical products manufacturer, said replacement of MCI satellite services with a 40-site MCI VNET has reduced the cost per call minute from 28.9 cents to 20 cents. Hercules plans to expand its VNET to between 50 and 60 sites in the near future.

Pete Derosier, telecommunications manager for the company, echoed the rave reviews of virtual net services. "VNET is an excellent service. Before VNET, we had some voice facilities of marginal quality. I call these same sites today, and there is a dramatic improvement in quality," he said.

Transamerica's Lamore explained that his company tracks the cost of the average telephone call, as opposed to pinpointing reductions in the cost per telephone call minute. "Before SDN, we estimated we were paying \$1.51 for the average telephone call, which we calculated lasted four minutes," he explained. "By using SDN, we first reduced that cost to \$1.01. In August, a four-minute call cost about 95 cents."

Ken Cardoza, telecommunications associate director for Racal-Milgo, Inc., which operates a 20-site VPN, said a typical long-distance virtual net call, which he said averages 4½ minutes in duration, is 8% to 10% less expensive than a call placed over long-distance facilities used before the VPN cutover.

However, virtual net users such as Weyerhaeuser Information Systems and Racal-Milgo, Inc. have encountered frustrating billing problems. Weyerhaeuser, which uses VPN and SDN, experienced billing problems with both services. Susan Mersereau, telecommunications services division director with Weyerhaeuser, said her company, AT&T and US Sprint all use different length billing periods, none of which coincide.

"All three of us may be using 23-day billing periods, but they aren't the same 23 days," she explained. Bills for both services have been

late, she added. "If the bill is one day late, it creates major problems for us because we bill all end users for their calling services."

Racal-Milgo, another longtime VPN user, also discussed its billing problems. "The VPN bills have been late and inaccurate," Cardoza said. "The VPN bill is extremely difficult to understand. I don't know how we would go about validating it."

Mersereau and Cardoza added that their carriers are working to rectify the persistent billing problems.

Derosier and Edison, both VNET users, said they were particularly impressed with their respective vendors' willingness to work with users to modify the services and resolve problems. "MCI has been very willing to work with our telecommunications people in a number of different areas," Derosier said.

Edison added, "We helped MCI define several characteristics of VNET. They were far more responsive to our needs than other virtual network vendors."

Users rely on different methods to determine whether to add a site to the virtual net. Transamerica's Lamore explained that before AT&T introduced dial access to SDN, only sites with more than \$1,000 a month of calls between local access and transport areas were viewed as candidates for SDN. Now, Lamore said, any site with at least \$500 per month of inter-LATA calling can be added to the network.

"Although dial access has served to open the network to many smaller sites, Transamerica still has numerous sites that don't generate this amount of monthly long-distance calling," Lamore said.

Racal-Milgo's Cardoza said a company location would probably be added to his company's virtual network if the long-distance calling traffic generated from that location exceeded the cost of tying the site to the network. □



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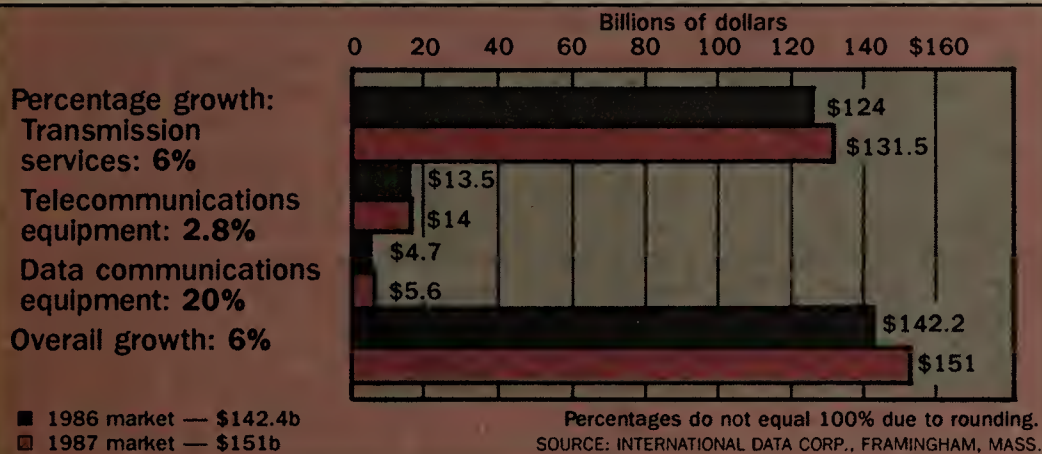
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INDUSTRY UPDATE

MasterCard purchases Cirrus System

MasterCard International, Inc. has gone ahead with plans to purchase Cirrus System, Inc., the nation's largest automated teller machine network provider. Cirrus will operate as a separate entity, with its own management team and board of directors. "The deal is a win-win situation for everybody involved," said Bruce Burchfield, president and chief executive officer of Cirrus. "Cirrus members gain access to MasterCard's international telecommunications capabilities, and MasterCard becomes the world's leading debit card organization." Consumers will be able to access funds through about 30,000 domestic and international ATMs.

Growth in communications equipment and services markets by segment



DEREGULATION

California weighs AT&T liberty plan

Carrier seeks pricing, product freedom.

BY PAM POWERS
Senior Editor

SAN FRANCISCO — AT&T officials recently met with the California Public Utilities Commission (PUC), long-distance rivals and other concerned parties to discuss ways to monitor market changes that could occur if AT&T is granted greater freedom from long-distance regulations within California.

In July, the California PUC invited AT&T to submit an Application for Regulatory Flexibility and a plan to track the consumer and industry effects of approving such a plan. Specifically, AT&T is seeking freedom to establish pricing bands for existing services that would provide boundaries within which AT&T could raise or lower rates without obtaining prior ap-

proval from the California PUC. AT&T would simply be required to notify the PUC five days before changing rates.

The carrier also seeks the freedom to introduce new services in California five days after notifying the PUC. Current regulations require prior California PUC approval of new AT&T services.

The PUC "is willing to give AT&T that flexibility if AT&T takes a monitoring approach and assesses what impact its freedom has had on ratepayers and competing carriers," said California PUC Regulatory Analyst Chris Ungson.

The workshop held here two weeks ago to evaluate the monitoring plan proposed by AT&T brought together representatives from Pacific Bell, the California Long Distance Association, local

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START-UPS

Netrix gets more cash, adds new executives

Readies for integrated switch debut.

BY PAM POWERS
Senior Editor

HERNDON, Va. — Netrix Corp., a start-up company that will soon bring an integrated packet/circuit switch to market, announced last week its second round of financing and three new executive appointments.

Lead investor New Enterprise Associates in Baltimore, in conjunction with Merrill, Pickert, Anderson and Myer and other venture capital firms, invested another \$5.46 million in Netrix, bringing the company's total funding to \$7.96 million.

Appointed to the newly created positions of vice-president of sales and controller were Louis Pace, formerly vice-president of sales with Atlantic Research Corp., and Theodore Pennington, formerly controller for Iomega Corp.

Thomas Jones, formerly a vice-president of marketing for Codex Corp., has been appointed to the vacant post of vice-president of marketing for Netrix.

Netrix was founded in early 1986 to develop what the company believes will be the first wide-area networking switch integrating X.25 packet-switching and high-speed transparent multiplexing technologies.

Jones said the company is projecting product introduction and availability by the first quarter of 1988. The switch will be sold through third parties to commercial and government users.

"These executive appointments show that we're moving out of the development stage and into the marketing stage," Jones said. "We

intend to take a running start in the market. By year-end 1988, we will have established a proven track record with a number of customers." □

VENDOR VIEW ROBERT B. FULTZ

Pointing the way to X.32

Several public data networks (PDN) are beginning to offer basic X.32 dial-up service on a limited basis. Although these services do not take advantage of the full X.32 Recommendation, they set a strategic direction for the future.

CCITT Recommendation X.32 was provisionally approved in 1986. It defines an extension of the X.25 protocol that enables personal computers, terminals, packet assembler/disassemblers and mini- and mainframe computers to access PDNs using dial-up telephone lines. X.32 also defines requirements for operating in a switched environment, such as caller identification for billing purposes, synchronous dial-out capabilities and on-line registration to request more services.

The costs of using X.32 are variable, given the dial-up access, and it can yield savings for customers that need to be

Fultz is product group manager at Tymnet/McDonnell Douglas Network Systems Co.

on-line only a few hours a day. Customers that want to access PDNs using X.25 have to pay for an X.25 network interface and lease a dedicated network access line, both of which carry a fixed monthly charge.

X.32 is meant to be implemented using high-speed dial-up modems, such as V.22bis at 2,400 bit/sec or V.32 at 9.6K/4.8K bit/sec, operating in a synchronous mode. Once a modem connection is made, X.25 procedures establish the call. Optional facilities may also be requested at call setup time, either at the link or packet level.

Obviously, changing from a leased line to a dial-up line could affect performance because of the data errors associated with dial-up lines. However, undetected errors are minimized with X.25, which has an error-protection protocol. In addition, if V.32 modems with Trellis coding are used, line errors should be very infrequent.

While X.32 can be used to back up dedicated X.25 interfaces to a PDN, the personal

computer market offers the most exciting opportunities for X.32. If X.25 replaces asynchronous communications in the personal computer world, the whole X.32 market will boom.

But there are a few obstacles to overcome. Personal computers would have to be outfitted with new hardware for synchronous X.25 communications, and the communications software would have to be as user-friendly as the current popular asynchronous packages, such as Crosstalk from Digital Communications Associates, Inc. or Smartcom from Hayes Microcomputer Products, Inc. A user shouldn't need to know X.25 in detail to use the software.

Additionally, applications need to be developed in the corporate environment to take advantage of personal computers with the power of X.25.

And finally, the cost per personal computer must drop into the \$400 to \$500 range, dramatically lower than the current \$1,000 to \$2,500. (A personal

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► TRAVEL NETWORKS

Capture software aids corporate travelers

BY JOSH GONZE
Staff Writer

DALLAS — Expanding the reach of its Sabre Travel Information Network, American Airlines, Inc. recently introduced cost-control software that corporations can use to help them manage their travel expenses.

The airline plans to offer the software, named Capture, as a way for users to capitalize on the reservation data already collected on Sabre and help them automate management of travel expenses. "We felt it was a natural adjunct to the data we were collecting on Sabre anyway," said Terry Jones, American's vice-president of product development for Sabre. "Corporations told us they want to begin controlling travel expenses."

Beginning Oct. 1, American Airlines will work in conjunction with large travel agencies to offer Capture to corporations with large travel budgets, according to Al Ramacciotti, president of American Airlines, Inc.-Capture, a separate business unit set up to market the package. The package is now in

beta test, he said.

At first, Ramacciotti said, Capture will interface exclusively with Sabre, a large travel reservation network sponsored by American Airlines and used by travel agencies and corporations to book flights, hotels and car rentals. Eventually, interfaces to other airline and hotel reservation net-

Beginning Oct. 1, American Airlines will work in conjunction with large travel agencies to offer Capture to corporations with large travel budgets.

works will be offered, he said.

Bill Keatley, director of technical support at Capture, explained, "We don't want to limit ourselves to just Sabre. Capture will be talking to other airlines, and instead of going through Sabre to get hotel records and detail records, we may go directly to the hotels and interface there."

Ramacciotti said, "Capture has two basic purposes: No. 1 is to

make the expense-reporting process easier for the traveler. No. 2 is to give the corporation the information it needs to understand and manage its travel expenses."

Capture, which currently runs on most Unix-based minicomputers, pulls reservation data over an RS-232 connection from a Sabre node located on the user's site. The user must pay the lease costs of the node, which is linked via leased lines to the Sabre hub in Tulsa, Okla.

The Capture software does not require that reservations be made from the Sabre node on the user site. The unique address assigned to each user on the network enables reservations to be entered from a travel agency or anywhere on the network for processing at the Tulsa hub. The record will then be downloaded to the company's leased Sabre node. The node will then transmit the record to Capture.

The package will perform pre-travel review, such as checking reservations against company travel policy, and will print out a travel expense worksheet for the traveler to fill in while on a trip. At trip's end, worksheet entries will be keyed in manually for bill allocation, advance reconciliation and other travel-expense processing.

Early versions of Capture will run on Unix-based machines with at least 2M bytes of memory above that used by Unix itself. Versions are planned for other common types of minicomputers, such as Digital Equipment Corp. VAXes, and some IBM machines, such as the 3090 and 9370. Mainframe and microcomputer versions may be developed in the future, Ramacciotti said.

The Capture software itself will be available as a monthly rental or at a five-year license fee, which for a large company might be roughly \$50,000, Ramacciotti said. In addition, there may be a usage charge for each record sent to Capture, he said. □

Pointing the way to X.32

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computer can be outfitted for asynchronous communications today for about \$250.)

If you are interested in using X.32 simply for error protection, it may not be the right solution. Most PDNs offer some form of asynchronous error protection today that is less expensive than X.32, such as X.PC. And if you are looking for higher speed dial-up access, most PDNs offer 2,400 bit/sec access, and some even offer 4.8K bit/sec on a limited basis.

While PDNs are working to offer X.32 services, widespread implementation and installation of the full X.32 Recommendation takes time. The rest of the '80s will see PDNs adding capabilities to their X.32 offerings as well as rapidly expanding the number of access locations. This expansion will occur as fast as the market demands. □

California weighs AT&T liberty plan

continued from page 9

exchange carriers and independent local telephone companies, area utilities, Bay Area Teleport, US Sprint Communications Co. and MCI Communications Corp. They discussed what variables to measure as part of the monitoring program.

AT&T suggested that the impact on consumers could be measured by assessing, within the state, the continued universal availability of local telephone service, the number of customer complaints to the California PUC, the availability of similar services from competitors and the emergence of new technology, services and pricing options.

AT&T proposed a similar four-pronged method to evaluate the effect of the plan on its long-distance competitors. Within the state, AT&T said measures should be taken to determine the ease with which competitors can enter or leave the market, their ability to serve customers, their growth rates as assessed by revenue and minutes of customer use and the trends in market shares for the long-haul companies.

California would be the 13th state to ease regulation of AT&T if the plan is approved. Within the past five months, Minnesota and Washington relaxed their rate-of-return regulation.

"Gathering the data to monitor the effects of AT&T's proposed freedom in this state is an enormous task," Ungson said. "An observation route like this is preferable to trying to predict an outcome, because we can, with solid data, reassess our decision two years from now — but some data is unobtainable, and some may not be a valid measure."

Jeff Close, a senior consultant with the Ann Arbor, Mich.-based DMW Group, Inc., affirmed the difficulties associated with monitoring competition. "There's still a lot of argument about the carrier's market shares, which different people measure in different ways," he said.

Despite the obstacles, AT&T will submit to the PUC a revised monitoring plan on Oct. 13, after reviewing and incorporating the suggestions of the workshop participants. Rick Wallerstein, an AT&T spokesman, said the carrier hopes to file for regulatory flexibility immediately after the second workshop.

California would be the 13th state to ease regulation of AT&T if the plan is approved. Within the past five months, Minnesota and Washington moved to relax their rate-of-return regulation for intra-state AT&T services. Of the 10 states that have given AT&T rate freedom for some time, seven have enjoyed declining rates, according to Jim Byrnes, an AT&T spokesman. □

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TELECOM TRENDS

Business telephone service costs drop

Continuing a price fall that began at divestiture, the average cost of business telephone services fell nine-tenths of 1% in the second quarter of this year, according to a report from CCMI/McGraw-Hill, McGraw-Hill Information Systems Co., a telecommunications rates and tariffs research firm.

The report said prices for toll calls and private lines were unchanged over the quarter, while prices of WATS services fell 1.6% from the first quarter. CCMI forecasts that, due to a 5% rate cut by AT&T put into effect July 1, the third quarter will bring further cuts in average prices of telecommunications services.

SELLING VOICE TO MANAGEMENT

Rolm, Intecom offer sales tips

Firms suggest innovative approaches.

BY BOB WALLACE
Senior Editor

Pitching a voice-messaging system that promises to speed or simplify communications within a company but which may not promise bottom-line savings represents a major challenge to telecommunications managers.

Voice-messaging system marketing experts from Rolm Corp. and Intecom, Inc. offered valuable insight to assist telecommunications

managers who want to sell top management on voice-processing systems for voice-messaging applications.

A voice-messaging system enables its end users to exchange information using a message store-and-forward technique that is often more flexible and easier to use than PBXs. These systems are especially useful to individuals, such as field salespeople, who are mobile and often find it difficult to reach called parties.

Jeffrey Crowe, marketing manager of Rolm's Messaging Products Division, said the company encounters two distinct types of top management when trying to sell voice-messaging systems. "There are top managers who are very dependent on cost-justification for these systems, while others understand the value of a specific application in the context of how it will improve the way the company does business," he said.

When upper management is set on dollar savings, one approach is to conduct a one- or two-month system trial before attempting to sell the system internally, Crowe said. "After the trial is completed, telecommunications managers can collect testimonials from key department heads and present them to upper management," he explained. "We have seen this meth-

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FCC SUPERVISION

Baby Bells submit financials

BY KARYL SCOTT
Washington, D.C. Correspondent

WASHINGTON, D.C. — The regional Bell holding companies recently fulfilled one of the Federal Communications Commission's key Third Computer Inquiry requirements, the submission of detailed accounting manuals that will allow the FCC to track RBHC costs for regulated and unregulated businesses.

The accounting manuals, sub-
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CROSS TALK BOB WALLACE

All voice systems are not alike

Although many vendors of voice-messaging systems can integrate their hardware with private branch exchanges, others can still interface only to PBXs, an important distinction that affects end-user capabilities.

According to Joan Patterson, product marketing manager for Intecom, Inc.'s Intemail voice-messaging system, voice-mail systems that simply interface to a PBX cannot offer users message notification in the form of a flashing light on the telephone set.

When voice-messaging systems are integrated with PBXs, the two can exchange information over the digital control link. In this process, the PBX passes called-party identification information to the voice-messaging system, which then signals the PBX regarding message status.

Voice-mail systems that are simply interfaced to a PBX also handle incoming calls differently than integrated systems. Callers receive a generic greeting from the system and are asked to key in a particular end user's extension to reach the desired voice mailbox.

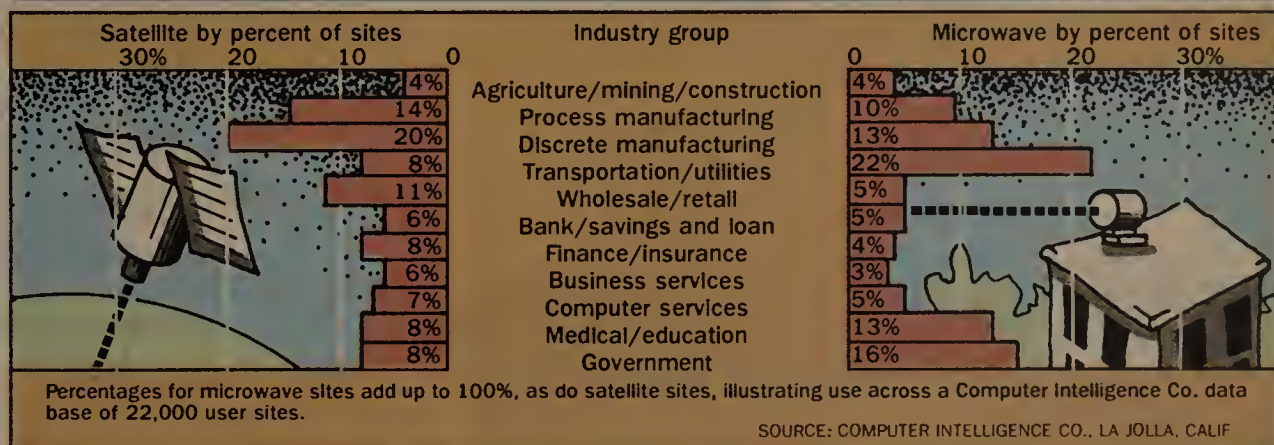
Integrated systems provide calling parties with a personalized greeting left by the system end user. If an incoming call is not answered by the desired party, the PBX passes called-party identification information to the voice-messaging system. The voice-mail system then knows to provide the caller with a personalized greeting and access to the appropriate voice mailbox.

Patterson and Jeffrey Crowe, marketing manager for Rolm Corp.'s Messaging Products Division, suggest that prospective voice-mail system users examine this differentiation before purchasing voice-mail systems.

Rolm's Phonemail, for example, is integrated with the Rolm CBX and now with Northern Tele-

See page 13

Use of microwave and satellite by industry



PBX INTEGRATION

Rolm integrates Phonemail with Northern SL-1 PBXs

BY BOB WALLACE
Senior Editor

SANTA CLARA, Calif. — Rolm Corp. recently announced it has successfully integrated its popular Phonemail voice-messaging system with Northern Telecom, Inc.'s SL-1 private branch exchanges.

The switchmaker also introduced Phonemail Call Processing, which enables callers to use menus of options to reach specific extensions or mailboxes. This system works with all Phonemail systems.

The integration of Phonemail with the SL-1, the vendor said, will enable the Northern Telecom switch to provide automatic telephone answering with multiple personal greetings, message notification and other features to users of the SL-1.

Phonemail Call Processing is said to allow a user to record a greeting that presents several options to callers. The callers may press a single key on any push-button telephone to select from a recorded menu

of names or extensions. A caller can also directly enter an individual's extension or name. Rolm claims use of this Phonemail enhancement will enable users to reduce the work load of call attendants, maintain after-hour call coverage and use incoming PBX trunk lines more efficiently.

Phonemail Call Processing menus can also include selections that route callers to mailboxes that contain messages recorded by the dialed party. Use of these mailboxes is expected to reduce the need for users on a Phonemail system to give the same information repeatedly to callers.

According to the vendor, Phonemail integration for SL-1 PBXs will be available as a voice-messaging system option beginning in the second quarter of 1988. Pricing for this added feature will start at \$2,000. Rolm said Phonemail Call Processing can be shipped immediately with new Phonemail systems at no charge. Pricing for Phonemail upgrades that will use this optional feature begins at \$2,000. □

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NW

Rolm, Intecom tips

continued from page 11

od work a number of times."

Informing top management about the competition can also help to make the sale. "A telecommunications manager could say to management that the company's top competitors are already using voice-messaging systems, and here's how," Crowe said. "This can be a strong nudge."

Telecommunications managers will benefit from carefully researching the pros and cons of using voice-messaging before approaching management, Crowe said. "These managers are gathering stories about voice-messaging system users as well as reports from market research firms before meeting with senior management to discuss the situation."

Making top management aware of the need for such a system requires less effort as time goes by, he said. "Today, more often than not, senior management has heard of voice messaging. The telecommunications manager is no longer the missionary spreading the word."

Crowe said telecommunications managers will generally find it easier to sell management on voice-messaging systems with added features, such as voice processing. This feature, he explained, would likely enable the company to reduce its number of telephone attendants or the number of employees who read out information, as does a college's menu of courses.

The telecommunications manager may wish to include a voice-messaging system as part of a large network request for proposal, drawing management's attention away from the add-on to the private

branch exchange. One voice-messaging system user, who requested anonymity, said burying mention of the system in a large network RFP enabled him to sneak it by top management.

Another voice-messaging marketer argued that, without upper management's support, the voice-mail system would likely be used very little. Hal Denton, vice-president of product marketing for Intecom, said, "Executive management must use the system if it is going to be successful," he said. "If your boss never leaves messages for you on the system and he doesn't check messages he is sent, you probably won't use the system either."

Denton said that although some users try to include a voice-messaging system in their PBX or network RFPs, only 10% of Intecom IBXs are initially sold with such systems. Most users, he noted, acquire voice-messaging systems at a later date.

The product marketing manager said telecommunications managers will find some applications for voice messaging easier to sell than others. "Voice-messaging systems for sales and marketing applications are the easiest to sell because these are the people who travel the most and need a [flexible system]," he said. "These users will drive the use of the voice messaging system."

"Applications for voice-messaging systems become tougher to sell in cases where the end users involved are only slightly mobile," Denton explained. "If the end users are at their desks all the time and are able to answer the telephone, the telecommunications managers will have a difficult time justifying the need for a voice-messaging system." ■

All voice systems

continued from page 11

com, Inc.'s SL-1 digital voice/data PBX.

Voice-mail systems integrated with a PBX enable callers to record, send, listen to, save, delete and forward messages.

"If a user is planning to standardize on a single vendor's voice-mail system for networking purposes," Crowe said, "there may be one or more different brands of PBXs that the messaging system can't be integrated with."

Patterson said users who purchase voice-messaging systems before they buy their current PBXs may

also be forced to use voice-mail systems that can't be integrated with the new PBXs. Other users, she added, may be waiting for a

Baby Bell financials

continued from page 11

mitted Sept. 1, are designed to give the FCC and the public a detailed look at the inner financial workings of the RBHCs' businesses.

The new accounting methods, adopted in December as part of the FCC's Computer III regulations, are intended to discourage the RBHCs from subsidizing new, unregulated business ventures with profits from their regulated telephone operations. In theory, the FCC will be able to spot illegal cross-subsidization through the accounting information.

"Theoretically, the accounting safeguards should work," said former FCC Commissioner Henry Rivera, now an attorney with Dow, Lohnes & Albertson here. "But theory and reality are sometimes quite different. The FCC had long maintained it couldn't handle a cost-accounting system of regulation, and now that's what it's got. The public is going to have to judge whether these safeguards are adequate."

The FCC is expected to review each RBHC accounting manual, consider public comments and then decide whether the manuals satisfy its requirements. The RBHCs must implement FCC-approved accounting plans by January 1988 and must have independent auditors review the manuals for compliance with FCC rules.

The accounting rules require the RBHCs to determine the costs for regulated and unregulated businesses and maintain separate accounts for each. Regulated services include all local telephone services and local access services offered under tariff. Unregulated services include, among other things, non-tariffed protocol conver-

sion services and the sale of customer premises equipment and customer premises wiring.

While the accounting requirements are among the most important ratepayer protections under Computer III, they may receive little public scrutiny due to their complexity.

User groups said last week it will take more than the 30-day public comment period established by the FCC for them to review all the manuals.

"A 30-day review period is absurd," said Brian Moir, attorney for the International Communications Association. "If the FCC doesn't grant more time, users are going to feel the commission is less than sincere in its attempt to create a new form of regulation that protects ratepayers."

Furthermore, some users say they don't have the expertise to review these complex documents, and they question whether the FCC has the resources to review these reports adequately.

"I'm sure there will be lots of tacit cross-subsidies without stringent reporting and accounting requirements," said Kenneth Phillips, chairman of the Committee of Corporate Telecommunications Users,

"although it's difficult for us to determine whether the FCC accounting rules are adequate. We simply don't have the resources to delve into this issue."

The accounting manuals must delineate costs shared by both regulated and unregulated businesses, such as use of a central office switch that routes traffic for both regulated telephone services and unregulated information services. The RBHCs must work out a method to apportion such joint costs between regulated and unregulated accounts.

"This is one of the most crucial areas of the accounting plan," said James Blaszk, attorney for the Ad Hoc Telecommunications Users Committee. "We will be watching closely to see that the RBHCs fully account for joint costs and adequately value the costs associated with unregulated activities."

The RBHCs must also account for the time employees work on unregulated and regulated activities and describe how they will forecast future costs.

The accounting regulations replace the old Second Computer Inquiry separate subsidiary rules that required the RBHCs to set up separate companies for unregulated businesses in order to prevent cross-subsidization. ■

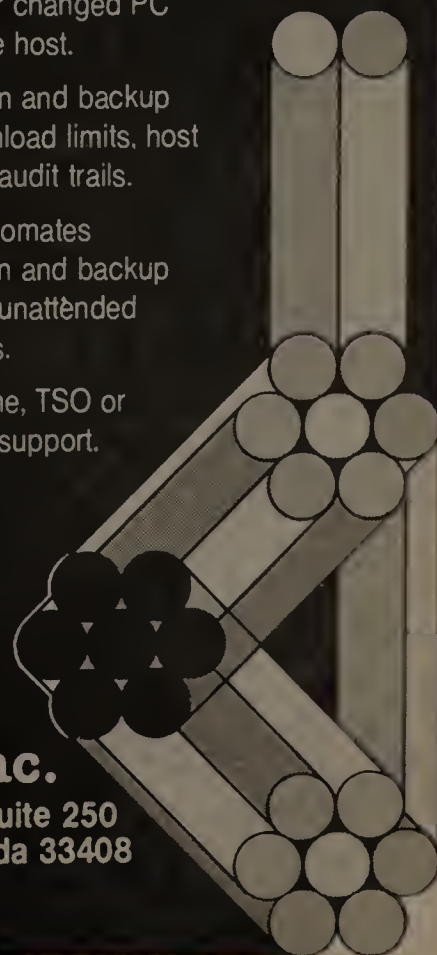
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DATA DELIVERY/ NET MANAGEMENT

► NETWORK ALTERNATIVES

Channel extenders win user acceptance

Firms use extenders to link remote processors.

BY PAUL KORZENIOWSKI
Senior Editor

A small number of the nation's largest users are adopting channel extenders to link remote mainframes to central facilities rather than routing that traffic through front-end processors, the method typically used to link sites.

Channel extenders attach directly to mainframe channels, called host block multiplexer channels, on IBM mainframes. These channels operate at 24M bit/sec and are usually used to support disk drives, high-speed printers, front-end processors and other mainframe devices.

Because of the high speeds supported and the nature of channel communications, connections to block multiplexer ports are typically limited to distances of a few hundred feet. Channel extenders can greatly expand on that within a building and can virtually eliminate the restriction when used in conjunction with high-speed digital communications services from telephone companies.

Today, geographically dispersed processors are linked through front-end processors. In the best case, a front-end processor transmits data at a speed of 1.544M

bit/sec, but in most cases, it supports a maximum port speed of 56K bit/sec. Some channel extenders transmit data at speeds up to 45M bit/sec.

Although channel extenders have been available for more than 10 years, they only recently began gaining market acceptance. "The market is growing at a high rate, and vendors are introducing different types of channel extension products," said William Redman, program director at Gartner Group, Inc., a market research firm in Stamford, Conn. Research firms peg the growth rate at between 20% and 30% a year.

That rate is expected to increase dramatically because IBM blessed the market in June by announcing its first channel extension unit that operates over telephone lines. The IBM 3737 provides a full-duplex point-to-point link over a T-1 line that operates at a speed of 1.544M bit/sec.

Larry Ladd, IBM senior product administrator for telecommunications product marketing at the company's information systems group, said large companies supporting multiple data centers were beating on IBM's door for the product. Many of these companies tried to set up backup

See page 16

"Data communications costs will overtake voice costs when we are equipped with terminals instead of mouths."

John P. Macri
Vice-president
Bank of America
San Francisco, Calif.

DATA DIALOGUE

ROSHAN LAL SHARMA

Start to finish, the prescription for net design

Many large corporations are discovering they must control their communications systems to remain competitive. To ensure that a communications system responds to a business' constantly changing needs, an in-house staff is essential.

A group of personnel experienced in project management, advanced network technologies, network design and analysis, and information systems should be assigned to collect data, reach conclusions, choose a solution and present the results to the top management.

Network planning is a complex process involving many diverse but interrelated tasks. The process includes eight steps that evaluate existing environments, present and future requirements, available technologies, network designs, an end-to-end transmission plan, a network management/control plan, a network cutover plan and a life-cycle return-on-investment analysis. In future columns, each item will be examined individually.

Existing environments

A comprehensive data base must be developed including information on five items:

- Network types, architectures, topologies and traffic routing.
- Communications facilities such as access lines, trunks and WATS.
- Switching facilities such as circuit/packet switches and private branch exchanges.
- Traffic data in the form of tapes or printouts.
- Major communities of interest.

If no traffic files are available, models of traffic flows between facilities should be built from in-depth interviews with concerned parties. All major business units in the company should be defined.

Current and future requirements

Detailed models of present and future networking requirements must be prepared through extensive analysis of available traffic information and the corporation's business requirements. Traffic analysis should yield location-to-location traffic flows for each hour. By collecting this information, a user can alternate routes during certain peak periods of the day and save money.

Each corporate business has its own priorities and grade-of-service requirements. Some businesses emphasize data communications and others voice. Such priorities may change suddenly in the future. Traffic intensities and traffic flows may change drastically in the future as a result of divestitures and mergers or just growth. Extensive interviews and analysis should be applied again to define the current and future requirements of each business. Gone are the days when the entire net could be designed by a single design criterion.

Available technologies

Many traditional networks have always em-

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Sharma is president of Telecom Network Science, a consulting and software firm in Dallas, Texas.

► IMPLEMENTATION SEMINAR

ISO deployment strategies clash

BY PAUL KORZENIOWSKI
Senior Editor

MONTEREY, Calif. — Because domestic and European vendors are taking different paths in designing networks that conform to international standards, customers may be saddled with inefficient gateways that link the two.

The standards squabble was discussed at "ISO Development Seminar," a three-day conference sponsored by Cupertino, Calif.-based Advanced Computing Environments, Inc. and held at the Doubletree Hotel here recently.

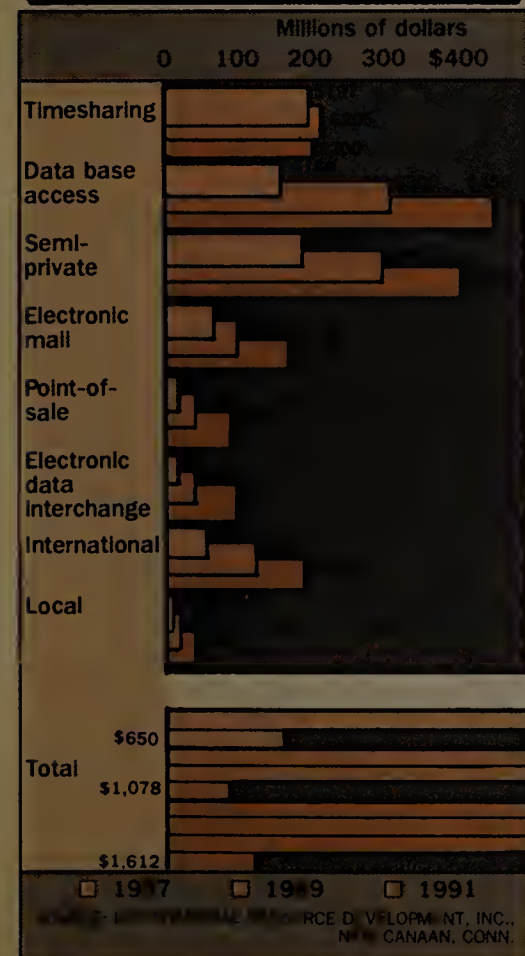
The International Standards Organization's (ISO) Open Systems Interconnect (OSI) seven-layer model provides guidelines for one vendor's equipment to be attached to other suppliers' gear.

The model specifies two options for the middle three layers — the network, transport and session layers — ensuring end-to-end data transmission.

European vendors, led by national telephone companies, favor the first option. This approach defines the road data takes as it moves from one destination, for example, Terminal A, to a second, Host B. Only Terminal A can use the road to get to

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U.S. packet-switching service revenue by application forecast



Extenders win acceptance

continued from page 15

data centers that would handle a company's processing requirements in case of a problem at the central site, but they found that traditional methods of linking the sites were too slow.

Some companies are also using channel extenders to distribute work among a variety of mainframes. "Aetna [Life and Casualty Co.] has three data centers, and each houses 10 mainframes," according to John De Santis, vice-president of sales and marketing at ChannelNet, an independent subsidiary of Data Switch Corp. in Sheldon, Conn. "The company uses our channel extenders to distribute certain jobs to mainframes with extra capacity."

ChannelNet offers a product that operates over T-3 lines, which support 45M bit/sec transmission.

DeSantis said that approximately 15 large companies, including Ford Motor Co., have purchased the product since its introduction in April 1986.

Channel extenders can also be used to improve the response time for users at remote locations. For example, Paradyne Corp.'s Pixnet product line can be used to link remote terminal controllers and printers to an IBM host block multiplexer channel. The Pixnet operates at speeds up to 1.544M bit/sec.

Last fall, Lee Data Corp. announced a similar product that operates over a T-1 line.

Unlike other vendors, Network Systems Corp. in Brooklyn Park, Minn., offers a high-speed network that links heterogeneous systems at channel speeds. Introduced more than 10 years ago, the company's Hyperchannel line was one of the first products to operate at chan-

nel speeds and currently supports 26 types of hardware and 50 operating systems.

Lyle Altman, president of Network Systems, said two beta users are experimenting with a new product to be announced at the end of this year that operates at speeds up to 275M bit/sec.

Channel extenders still lack a few key ingredients needed for widespread market acceptance. Bart Stuck, senior vice-president for market research firm Probe Research, Inc. in Morristown, N.J., said the software for applications that ride on top of the high-speed pipes is not very robust.

The Systems Center, Inc., a start-up company in Richardson, Texas, is one vendor trying to fill that void. The company's Network DataMover is designed to move large files among a variety of systems, such as IBM mainframes and the IBM Personal Computer.

In the next few months, the company plans to introduce its first product that works with Digital Equipment Corp.'s VAX line. Network management is another area in which improvements are needed. ChaCha Shvili, director of system consulting at Executive Teleprocessing Associates, Inc. in New York, said the diagnostic information supplied by channel extenders is often incomplete. "Users are unable to determine if a problem is with the channel connection or the applications running on top of the connection," he said.

Analysts expect vendors to address such issues over the next few years as the market grows. "We are still only in the first generation of channel extension products," said Probe's Stuck. As the tools evolve, channel extenders could play a key role in the development of the next generation of networking applications, such as distributed data bases. □

The prescription for net design

continued from page 15

ployed leased lines, virtual circuits (for example, WATS lines) and value-added network services in order to lower operating costs. Lately, the options are increasing at a very rapid rate. Bypass technologies such as digital microwave, very small aperture terminals, laser and fiber optics are becoming attractive for certain businesses. All such technologies must be studied, and several should be employed to satisfy the needs of all the corporate businesses through the development of a hybrid network. The availability of cost-effective T-1 multiplexers and digital cross-connect switches help make the hybrid net an attractive solution.

Network designs

The task of network planning can be facilitated through the use of highly interactive computer-aided tools for designing cost-effective hybrid networks based on diverse technologies. The use of new desktop computers based on Motorola, Inc.'s 68020 or Intel Corp.'s 80386 microcomputers should enable quick synthesis of all useful topologies for both local- and wide-area networks. Graphics must be employed to enable the designer to evaluate the current design or construct additional "what-if" solutions in rapid succession. Approximate tariffs should be employed to achieve a cost-effective solution quickly. One can show that topologies do not change significantly with slight tariff changes. Once a cost-effective topology is synthesized, the actual cost details can be obtained by the use of a line-pricing package or costing models.

Transmission plan

Many network plans have gone

astray due to the lack of a viable transmission plan. All the paths must be analyzed for signal levels and error rates. This analysis will help achieve the desired grade-of-service and quality-of-service requirements. AT&T and most of the regional Bell holding companies have developed methodologies for transmission planning.

Management and control plan

A large corporation can no longer depend on AT&T or an RBHC to manage and control its hybrid network effectively. Each corporation must instead become its own communications company in order to achieve full control of its telecommunications resources. Only then can a corporation determine its destiny in the marketplace. This will demand the development of a viable network management and control plan that may require the construction of one or more network control centers, each staffed by competent personnel.

Cutover plan

Each new network or major modification requires a multiphase cutover plan specifying the manner in which the various communications and switching facilities are ordered and put into service. Detailed testing and performance monitoring before and after the cutover must be planned, and the results must be documented.

Return-on-investment analysis

Network planning is never finished until a life cycle return-on-investment analysis is performed. This may require new accounting procedures based on the value of information and telecommunications to various businesses. Only by studying a meaningful cash flow can one decide upon the effectiveness of any solution or the need for another evaluation. □

ISO deployment strategies clash

continued from page 15

Host B, and the road remains open even when Terminal A is connected to another device, for example, Printer Z. By keeping the road open, the connection-oriented service makes sure that Terminal A is always able to reach Host B.

U.S. computer vendors favor the second option, connectionless services. This approach dynamically sends data down various roads. By increasing the number of possible options, this approach ensures each road is used efficiently. Sometimes a road may be clogged, and data will be sent back to the originator. With the connectionless service approach, Terminal A will not always be able to reach Host B on the first try. If a transmission is unsuccessful, data may be retransmitted at a later time.

Daniel C. Lynch, president of Advanced Computing Environments, said, "Each approach has proven to be reliable and is suited for specific types of applications." Connection services are good for bulk-data transfers, while connectionless services are good for

transaction-processing applications. The standards' divergence stems from financial rather than technical considerations. Traditional vendor boundaries, such as the distinction between voice and data products, are disappearing. Vendors are looking to establish their equipment as the most important items on customers' networks.

Telephone companies say connection services would help them gain that edge. "A customer would need a lot of connections to make sure every path stays open," Lynch said. Carriers are steering the European ISO ship. A small group of U.S. vendors, led by AT&T, also favors connection.

Lawrence Landweber, chairman of the computer science department at the University of Wisconsin at Madison, added a second reason telephone companies favor connection services. "Telephone companies would have a difficult time billing customers for connectionless services," he said. Telephone company customers pay for the road between connections.

With a connectionless service, the road disappears. Connectionless services, supported by U.S. computer vendors, not surprisingly, tend to require more CPU cycles than connection services.

The dichotomy will create problems for many large domestic companies. "Many large companies have at least a few international sales offices," said Bart Stuck, senior vice-president for market research firm Probe Research, Inc. in Morristown, N.J. Many of these companies say OSI products can be used to link the foreign sales offices to domestic data centers.

Instead, such companies will discover that linking a connection services OSI net to a connectionless services OSI net will be a problem. "The two approaches are antithetical ways of establishing a connection," Landweber said.

The Corporation for Open Systems (COS) examined the problem and submitted a compromise to ISO. If passed, the compromise, COS Amendment 265, would require that vendors support both connection and connectionless protocols in their middle-layer OSI products. Chances of the proposal

being widely endorsed are slim, according to seminar attendees. Developing software that supports both options is costly.

Even though a compromise is unlikely, users should eventually be able to solve the middle-layer problem. Landweber said the most likely solution will be gateways or protocol converters.

These devices will convert one type of network service to a second, an approach he labeled "kludgy," adding more processing overhead to the network and another device to be controlled.

Cost could become a deterrent to widespread OSI implementations. Lynch noted that OSI products initially will cost more than proprietary networking products, and OSI nets will use more processing horsepower than proprietary nets.

Both Lynch and Landweber said widespread installation of seven-layer OSI networks will begin in three to five years. Important pieces such as network management, directory services and routing of the model are still missing. These pieces could be filled in as early as next year, with products following in a few years. □

LOCAL NETWORKING

Growth forecast for the total number of networked personal computers*



NETWORK NOTES

Bridge Communications, Inc. of Mountain View, Calif., enhanced its CS/1-SNA network gateway to double the number of host sessions it supports and to operate over IEEE 802.5 token-ring and broadband networks as well as Ethernet networks. A faster 68020 microprocessor used in the enhanced gateway enabled the doubling of host session support without increasing its price.

Unlike the earlier version of the gateway, the new CS/1-SNA supports Transmission Control Protocol/Internet Protocol net access to Systems Network Architecture hosts.

The gateway, available now, is priced at \$10,500 plus a \$1,000 software fee. A hardware and software upgrade package for the original gateway is priced at \$5,000.

Corvus Systems, Inc., based in San Jose, Calif., released Version 1.1 of its PC/NOS distributed network operating system for Omninet networks.

The new release adds support for MS-DOS Release 3.3, expands the software's electronic messaging capability to include a broadcast function and further simplifies the process of connecting to network resources.

The new release also adds a number of utilities, including Netpoll, which provides compatibility with multitasking applications programs such as Microsoft Windows; several print spooler utilities, including print queue man-

agement; a purge utility, which de-installs the operating system for network workstation moves and changes; and a utility that maintains resource connections when the user logs off.

The software, available now, is priced at \$695. **E**

USER STRATEGIES

GTE airs ambitious Florida LAN plans

Multisite networks may support 6,000 nodes.

BY PAULA MUSICH

Senior Editor

TAMPA, Fla. — General Telephone Co. of Florida (GTE), a local operating company serving a six-county area here, has ambitious plans for expanding the local networks serving its operations and administrative personnel. GTE believes it will ultimately link some 6,000 nodes through a series of interconnected Ethernets in what the local telephone company expects will be one of the largest local net installations in the country.

On the operations side, a series of Bridge Communications, Inc. Ethernet networks at 12 remote sites in the six-county area currently interconnect some 450 nodes. Nodes in these so-called production networks are primarily personal computers used for such applications as customer

service, mechanized service call assignment and record keeping, according to Chuck Peterson, senior information management analyst for GTE.

The remote networks are linked to one another via Bridge internetwork routers as well as to a network here that provides centralized control.

The production networks, expected to save GTE some \$2.5 million in the first year of use, offer workstation users access to an interactive facilities management application provided by General Electric Information Services Co. (GEISCO) through its time-sharing network. Bridge X.25 gateways on the network are replacing more expensive intelligent multiplexers and data concentrators for access to the GEISCO network. In addition to reducing equipment expenses, the Bridge X.25 gate-

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LANMARKS

STEVE ADAMS

Arcnet and Ethernet go to bat

Arcnet and Ethernet are two networking schemes with their fair share of loyal followers. The happy thing about both is they are supported by a wide range of network operating systems — Novell, Inc.'s NetWare, Banyan Systems, Inc.'s Virtual Networking Software, Univision's LifeNet and so on — and they work.

Although, in the end user's eye, there is no difference in the operation or management of systems using the two technologies, they have very little in common from a hardware or communications standpoint.

To understand the operation and functionality of the two, baseball provides an apt analogy.

With Ethernet, for example, suppose all of the nine positions except the catcher of a baseball team were pitchers. And suppose the eight pitchers could throw only fastballs. Further, they could all throw a ball at the catcher at the same time. In an Ethernet network, all of the worksta-

tions can pitch the ball, that is, send a packet of information, to the server at the same time and at a very high speed — 10M bit/sec.

In this example, if the catcher dropped the ball, the pitcher would have to throw another one, thus limiting the overall effectiveness of that player. In Ethernet, the same holds true. If a workstation packet is not received and processed by the file server, the workstation must retransmit. Doesn't sound too efficient, does it? In the days before the advent of 3Com Corp.'s Ethernet Plus card, the performance of the average Ethernet network was pretty sad. The Plus card changed all that with its on-board 80186 processor and 128K to 512K bytes of random-access memory. In the baseball scenario, the installation of a Plus card in the file server is like giving the catcher a mitt measuring 4 ft by 5 ft that is able to catch 80 fastballs at once. This big catcher's mitt concept makes Ethernet with a Plus card in the server one of the fastest networks available.

Now on to Arcnet. Suppose the eight players in the field are pitchers but can throw only one-fourth the speed of their Ethernet

counterparts. The big difference here is that the Arcnet players have rules regarding who can throw the ball when. One ball is shared by all players of the Arcnet team. Each player must take turns and is only permitted a specific time in which to throw the ball. The catcher need not have an oversized mitt because only one teammate is throwing the ball at any given moment.

In networking terms, this sharing of the same ball and taking turns is called token passing. Because of the token-passing scheme, this type of network performs more predictably than its Ethernet counterpart.

Now for more technical trivia. Thin Ethernet uses RG58a/u coaxial cable while Arcnet uses RG62a/u coaxial. The Ethernet cabling scheme requires all workstations to be attached to the same cable in series. The maximum length of that cable is 1,000 ft. Going beyond 1,000 ft requires a repeater (\$1,800) or another Plus card in the server (\$895). Arcnet, on the other hand, is a star cabling scheme with a hub being the center of the star. An eight-port active hub costs \$595 to \$795.

See page 45

Adams is technical support manager of local networking reseller Sympro, Inc., based in Emeryville, Calif.

Hot topics coming your way this summer in Network World.

September 28: OPEN SYSTEMS — IBM/ TCA SHOW ISSUE

Just how open are IBM's open systems? *Network World* takes a hard look at Big Blue. And September 28 is also our TCA Show issue — with bonus distribution and detailed coverage of the show.

October 5: GATEWAYS AND BRIDGES

Both users and suppliers will learn which gateways and bridges connect with which vendor networking environments in LANs, WANs and MANs. Plus, *Network World* wraps up the TCA show.

October 12: OPEN SYSTEMS — TANDEM/CMA SHOW PREVIEW/ TELECOM '87 GENEVA PREVIEW

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October 19: CMA SHOW ISSUE/ SOFTWARE CONNECTION

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NETWORK WORLD

An IDG Communications Publication

GTE airs Florida LAN plans

continued from page 17

ways also allow more users to access a single line going into the GEISCO network, thereby reducing line charges.

"Our goal in implementing the Bridge network was to eliminate the expensive asynchronous connections we were using to access the GEISCO time-sharing network," Peterson said. Personal computers were linked to the GEISCO network through direct asynchronous connections, dial-up connections or through an intelligent multiplexer into a data concentrator. Up to 80 asynchronous data streams were fed into the concentrator, which condensed those streams into two 9.6K bit/sec lines. The Bridge X.25 gateway increased the number of asynchronous data streams going into the concentrator to 96.

The GEISCO application is a facilities management system that supports GTE dispatch and assignment centers as well as service representatives who take customer orders. The application is split into two cooperating modules: a host module running on a Honeywell, Inc. mainframe in Cleveland and a cooperating personal computer module running in each connected personal computer.

The networked personal computers interact with the host system using specially written software that requires more processing power than even intelligent terminals could provide.

GEISCO brought the Bridge alternative to Peterson's attention, and the company gave its blessing to use the Bridge X.25 gateway with the GEISCO network. That, Peterson said, was an essential part of GTE's decision to make the cutover. GEISCO demonstrated the local net for Peterson at its Rockville, Md., labs and worked with him on an economic study that illustrated the cost savings GTE could obtain.

By the end of the year, Peterson also expects to network GTE's three major service order centers, more than doubling the number of personal computers connected to the network.

The same personal computers in the production network are also linked via separate connections to IBM hosts at GTE's sister company here, GTE Data Services. These connections, accomplished using Digital Communications Associates, Inc.'s (DCA) Irma cards and dedicated coaxial connections to IBM cluster controllers, provide personal computer users with access to customer records as well as billing and service order entry system applications. Peterson also plans to provide shared access to the IBM host, using either Bridge's Etherterm program or DCA's Irma-lan program.

Because the sites are linked with Bridge's GS/300 internetwork routers, GTE has an alternate route to the GEISCO network in the event of an X.25 gateway failure at any given site.

Although the benefits of the administrative systems network project are not as easily measured, GTE is hoping to streamline administrative work and increase productivity among workers. GTE has installed five 3Com Corp. Ethernets, which currently interconnect some 600 personal computers, according to Peterson's counterpart, Chuck Heindel, a senior office systems consultant.

"With deregulation and losing people as a result of that, we had to make more efficient use of the resources we had," Heindel said. "Whatever we could do to increase productivity in the office environment, we assumed connectivity could help us achieve that."

GTE provided net users with shared access to an asynchronous communications server, replacing underutilized modem cards in individual personal computers. It was also able to replace individual Irma cards with shared access to Bridge's CS/1-SNA server for IBM host access because the Bridge and 3Com equipment is interoperable.

In addition to consolidating resources, the network has allowed GTE to eliminate paperwork through electronic messaging. By using the electronic mail system rather than memos and notes, GTE has realized a significant cost savings, not to mention time savings, according to Heindel.

"Getting people to use the electronic mail system rather than walking over to someone's desk has been easier than you might imagine," Heindel said. "Now, everyone leaves messages for people on E-mail. They pick them up, and they send back replies. It became so convenient because it saved time and effort. That's what we initially set out to do."

Eliminating paper handling was one of the goals GTE had in implementing a local network. "We wanted to move toward the concept of a paperless office, and we knew that would eventually mean putting a PC on almost every desk," Heindel said. Because GTE envisioned connecting all of those personal computers together, the network supporting them had to be capable of linking a large number of nodes. Heindel was convinced the 3Com/Bridge combination could do the job.

In addition to supporting a large number of nodes, Heindel found the network was easy to configure, easy to internetwork with other 3Com networks as well as Bridge networks and that network downtime was lower than the Novell, Inc./Proteon, Inc. pilot network he had previously tested. "And because the production systems were out there, it was easier to directly connect the two types of networks," he added.

Although Heindel said that it is impossible to cost-justify the massive office systems network, he said he believes it is still the least expensive alternative. "When you look at what it could have cost us for a mini or mainframe solution, it's peanuts," he said, "and that still wouldn't have given us the connectivity we wanted." □

COMMUNICATIONS MANAGER

T-3 users total 13

Fidelity Investments' recent T-3 contract with AT&T brings the total number of users subscribing to the 44.6M bit/sec service to 18, according to the independent weekly newsletter "The Report on AT&T."

► PROFILE

Information as a weapon

Wickes' Nichols uses networking to speed corporate recovery.

BY MICHAEL FAHEY

Senior Writer

SANTA MONICA, Calif. — When Keith Nichols joined Wickes Companies, Inc. in 1983, he was given the task of organizing a corporate telecommunications department for a far-flung conglomerate that was digging its way out of bankruptcy.

"Information is very important when you are in Chapter 11," Nichols said. "You cannot afford to waste time."

Wickes is the corporate umbrella for a widely diversified collection of businesses that logged more than \$4 billion in sales in 1986. Wickes emerged from bankruptcy less than three years after a Chapter 11 reorganization that began in 1982.

One of the first steps the company took in its efforts to put information to strategic advantage was to make business and financial information about Wickes' divisions available to corporate managers

here, using personal computers. The plan has since been expanded to the company's New York office to provide managers at the division level with access to company mainframes and outside data bases.

"We don't generate reports with this information," Nichols said. "It is available for senior management to go in and take a look at it with PCs."

"We have the voice and data going over the same cabling scheme," Nichols explained. "The PC is connected to a data module linked to the PBX. The PBX sends the data stream to a modem pool or to a multiplexer and then to data links going across the country."

According to Nichols, "The philosophy of using technology to gain a competitive edge pervades the company. We get to do things, as long as we can present a good business plan showing that there is an economic benefit from the project."

Nichols credits Wickes Chair-

man Sanford Sigoloff with fostering this philosophy. Sigoloff, a hard-driving acquisitions artist who holds a degree in physics and worked as a researcher on the effects of nuclear radiation on humans before joining the business world, is always ready to put technology to use in business, according to Nichols.



Keith Nichols

One way the company does this is through electronic links to its customers. For example, Nichols said, the Kayser-Roth Apparel division receives orders from customers such as JC Penny Co., Inc. and Sears, Roebuck and Co. by polling their mainframes.

Electronic Data Interchange (EDI) is utilized to minimize the paperwork involved in settling accounts with these customers, Nichols said.

The corporate telecommunications department is part of Wickes Data Services, a division of Wickes whose mission is to provide management information systems and communications support for other Wickes units. The telecommunications department charges divisions an hourly rate for its consulting services.

Nichols reports directly to Bill Mann, vice-president of Wickes Data Services and an officer of the corporation. "When I have an idea for a project, I discuss it first with Bill Mann," he said. "If it looks worthwhile, we assign it to someone on the staff to bring it to a stage where it can be presented to top management," Nichols said.

"At that stage, it is a study project, and then we present the financial information and reasons for the project to the chief financial officer, who gives permission to fund it," he continued.

Currently, Nichols is planning a nationwide T-1 network that would link Wickes' divisions.

The plan, which is still awaiting the go-ahead from top management, is designed to lower communications costs, increase reliability and speed up the process of adding users to the network, Nichols said. The network will replace several data networks serving the company.

"We have a design, and now we are putting together a capital appropriations package for senior management," Nichols said.

"We completed an analysis of what it will cost to build the network and what we can expect to save by using it to aggregate our bandwidth."

Further, Nichols said, the proposed network would support Synchronous Data Link Control, Binary Synchronous Communications and asynchronous protocols — a major selling point for a company that is in the practice of acquiring other companies with a variety of networks.

Nichols received his early technical training in the Navy. Since then, he has earned an undergraduate degree and a master's degree in business administration and is working on a master's degree in telecommunications at San Francisco's Golden Gate University. □

GUIDELINES

ERIC SCHMALL

Thinking about the unthinkable

The Red Queen in Lewis Carroll's *Through the Looking Glass* told Alice that she made it a habit to think of six impossible things before breakfast every day. Such a talent is a necessity for a communications manager assembling a disaster recovery plan.

Of all the contingencies for which a communications professional must prepare — tariff changes, technological breakthroughs, massive shifts in user patterns — the most frustrating is disaster recovery. Novelist Walker Percy said that a fish does not reflect upon the nature of water because "he cannot imagine its absence, so he cannot consider its presence." To a large degree, an organization's management views communications the same way. It has become a pervasive and critical ingredient throughout all enter-

prises. Senior officials have trouble even contemplating what would happen should communications suddenly cease. The communications manager has the unpleasant task of leading them to the edge of the abyss and inviting them to peer into it.

Grappling with the issue of disaster recovery involves a remarkable commitment of the communications manager's time. The manager will have to provide scenarios describing major communications losses and illustrating how quickly they can be restored.

This means first documenting the current network configuration, prioritizing the proper service restoral patterns and researching the various methods available for recovery — hot site vs. cold site, dial vs. leased line and so on.

Then, a plan of action must be recommended.

All of this will cut into the time a manager can devote to

more immediate day-to-day communications needs. And despite all of the work involved for the manager, it is doubtful that the subject of disaster recovery will inspire a quick response from upper management. In fact, communications managers can expect to see their disaster recovery plans come back for further study and refinement.

Top management views the prospect of disaster within the organization with the same reluctance that individuals reserve for viewing their own mortality. And once management finally considers the matter, it will be some time before it is willing to assign time and money to develop a comprehensive disaster recovery plan.

Throughout the process, the communications manager has to convey a measured sense of urgency for the project while providing a realistic view of the disaster probabilities and devising an appropriate plan to meet the disaster. □

Schmall is network systems manager for an insurance holding company.





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NEW PRODUCTS AND SERVICES

See inside for:

- KEA Systems VT220 emulator
- Develcon X.25 PAD
- Microwave radios

► TERMINAL ADDITIONS

AT&T enhances 6500 line

Extends communications options for 3270-plug compatibles.

BY JOSH GONZE

Staff Writer

PARSIPPANY, N.J. — AT&T revealed enhancements to its family of IBM 3270 plug-compatible products at a press conference held here two weeks ago to announce two new computers.

The enhancements are designed to refine and extend the communications options open to users of the company's 6500 Multifunction Communication System. The 6500 product family includes several terminals, printers, a communications controller and controller modules.

The new Plug-Compatible Interface Module enables the AT&T 6544 Communications Controller, a terminal controller, to support both IBM 3270-type peripherals and AT&T proprietary terminals

and printers. The controller enables users to access up to two applications on single or multiple hosts.

A single interface, consisting of a hardware module and associated software, supports up to 16 attached devices. The 6544 controller can support two interface modules, for a maximum of 32 attached devices.

The interface module will be available in July 1988 at a price of \$4,730.

AT&T also announced a local channel attachment module for the 6544 Communications Controller. The interface allows the controller to be directly attached to the mainframe, supporting higher operating speeds and better performance.

The Local Channel Interface Module uses the same software as the Plug-Compatible Interface

Module and, according to AT&T, provides the same features as a remotely attached 6544 controller. The interface module and software can be installed in new or existing 6544 Communications Controllers. The channel interface will be available in July 1988 for \$3,350.

Adapter provides links

The final addition to the 6500 product line is an adapter that provides better links to the 6544 controller for AT&T's 6300 and 6310 personal computers. The 2-N-1 Adapter allows seven concurrent windows to be used for four synchronous host sessions, two notepads and one personal computer session. The adapter is priced at \$1,045.

The 6500 announcements were part of a larger set of product unveiled two weeks ago, which in-

cluded the 3B4000 high-end mini-computer and 6386 Workgroup System microcomputer ("AT&T unveils computers," NW, Sept. 7).

AT&T also added four IBM plug-compatible terminals to its 6500 product line. Designed for use with 3270-type cluster controllers, the terminals vary in screen and keyboard size and are each meant to replace particular types of IBM terminals.

The 6578 terminal has a 14-in. monochrome screen and 87-key keyboard, and it is compatible with IBM Models 3278 and 3178. The 6579 terminal has a 14-in. color screen and 122-key keyboard. It replaces IBM Models 3279, 3179, and 3192C. The 6580 terminal has a 14-in. monochrome screen and 122-key keyboard, and it is compatible with IBM Models 3180-1 and 3192D. The 6591 terminal has a 14-in. flat monochrome screen and 122-key keyboard and is compatible with IBM Model 3191.

Prices for the terminals range from \$1,165 to \$1,705. AT&T can be reached at One Speedwell Ave., Morristown, N.J. 07960, or call (800) 247-1212. □

► CIRCUIT RESTORAL

Backup reroutes data over DDD

BY MARY LINEHAN

Staff Writer

SPRINGFIELD, Va. — Atlantic Research Corp. recently introduced a new multiline dial backup system that can be used to restore failed point-to-point and multipoint circuits by temporarily rerouting data through the direct distance dialing (DDD) network.

The new system, called the Restorer, is targeted at organizations that are sensitive to downtime, such as financial institutions and airlines, the vendor said. In the event of a leased-line failure, the Restorer establishes two DDD circuits to the site in question. For restoration of multipoint circuits, a single command from the Restorer's CRT allocates DDD lines from a pool of dial-up lines, automatically establishes the calls and transfers the data through the new dial-up path.

According to the vendor, the new system works with most modems and dial backup remote units, provides one system interface for point-to-point and multidrop circuits and does not require a separate control processor since all operations are issued from an ASCII terminal.

The Restorer, comprising Atlantic's MDB-100 central-site dial backup unit, ADU-50 remote-site dial units and a terminal, can support up to 512 lines.

The Restorer is available now and is priced from \$13,000 to \$50,000, depending on configuration.

Atlantic Research's Teleproducts Division is located at 7401 Boston Blvd., Springfield, Va. 22153, or call (703) 644-9190. □

► DATAPHONE II

AT&T releases new modems

BY JOSH GONZE

Staff Writer

PARSIPPANY, N.J. — Adding to the slew of networking enhancements announced here two weeks ago, AT&T unveiled a set of new modems and network management products for its Dataphone II product line.

The 2192A modem is a full-duplex, synchronous private-line modem that operates at speeds up to 19.2K bit/sec and comes with an integrated six-port time-division multiplexer. The modem's automatic diagnostic capabilities can, according to AT&T, test any of the six ports without affecting service on the remaining five. The 2192A modem is priced at \$9,500.

AT&T also introduced the 2296A, a full-duplex modem with a V.32 interface. The modem can operate synchronously or asynchronously at either 4.8K or 9.6K bit/sec over switched or private lines. When equipped with an optional automatic dialer, the modem can automatically restore service via dial-up facilities. The 2296A modem is priced from \$2,500 to \$3,100.

The rack-mounted 2224G and stand-alone 2224CEO are 2,400 bit/sec, asynchronous, full-duplex dial-up modems. They are compatible with V.22bis and V.22 standards, as well as Bell 212A and 103 standards. Both use Microcom, Inc.'s Microcom Networking Protocol error-checking protocol. Other features include AT&T or Hayes Microcomputer Products, Inc. Smartmodem 2400 dialing protocol, built-in diagnostics, 19-number autodial

capability and automatic answering. The 2224G fits in a rack of up to eight modems and costs \$650. The 2224CEO costs \$695.

AT&T extended the Dataphone II network management system with an interface that allows it to control the company's 2248A and 2296A modems. Called the 48/96A Shared Diagnostics Unit, the interface costs \$625. The 745 Acculink Multiplexer nodal processor was also announced. It works in conjunction with AT&T's 740 Acculink Multiplexer and enables users to control up to 16 T-1 circuits. It is priced from \$10,000. To manage the 740 and 745 Acculink multiplexers, AT&T introduced a software enhancement for the Dataphone II system controller. The system controller centralizes Dataphone II network management. It allows users to monitor, control, test and reconfigure the multiplexers. An upgrade costs \$15,000.

The company also unveiled a dial backup unit for private lines. A stand-alone version works with full-duplex private-line modems, while a rack-mounted version works with point-to-point or multipoint circuits. It is priced from \$695.

AT&T introduced Release 4.0 of its net management software for the System Controller 300/400, a modem management system. The new software extends management to analog private-line modems, data service units and shared diagnostic units. The software will be provided to 300/400 customers free of charge.

AT&T is located at One Speedwell Ave., Morristown, N.J. 07960, or call (800) 247-1212. □

► SOFTWARE

Centram speeds up PC TOPS

Transmission is three times as fast.

BY MARY LINEHAN
Staff Writer

NEW YORK — Centram Systems West, Inc., the Berkeley, Calif.-based developer of the Transcendental Operating System (TOPS) local network, recently announced a software update that enables TOPS to run at more than three times its former speed.

The new TOPS software enables personal computer-to-personal computer transmissions to take place at .77M bit/sec.

TOPS is a personal computer local-area network that is implemented on network-attached microcomputers instead of a single server. It is said to provide transparent links between DOS, Unix and Apple Computer, Inc. Macintosh operating system environments.

To enable TOPS to communicate with Macintoshes using Appletalk, Centram incorporated the same 8530 chip used in the Apple Macintosh personal computer on its TOPS IBM Personal Computer network interface card. Although that chip confines network speed to .23M bit/sec, the TOPS card's clocking mechanism overcomes that limitation and allows personal computers to communicate at .77M bit/sec.

The personal computer software contains an automatic speed switch that takes advantage of the TOPS card's clocking mechanism by enabling personal computers to communicate with Macintoshes at slower speeds, while microcomputer-to-microcomputer transmissions take place at a faster rate.

According to the vendor, every personal computer on a TOPS network will be able to handle two transmission rates at any time because nodes negotiate the speed of transmission.

The network recalls which computer uses which speed, so nodes do not have to renegotiate the transmission speed each time.

Pricing

The new, faster version of TOPS for the personal computer will begin shipping in the fourth quarter of 1987. It costs the same as the older version of TOPS for the personal computer: \$389, including software and TOPS card.

Software updates, which will be compatible with TOPS existing installed base and will not require hardware changes, will be available.

Centram Systems West is located at 2560 Ninth St., Suite 220, Berkeley, Calif. 94710, or call (415) 549-5900. ☐

First Look

Two microwave radios available to federal users

Loral Terracom recently introduced two new MicroLink microwave radios capable of supporting data, voice and video communications to help government users establish low-cost private telecommunications networks.

MicroLink 15 and **MicroLink 23**, part of the family of advanced microwave radios, are 15 and 23 GHz radios, respectively. Loral Terracom is targeting the microwave systems at military installa-

tions, Veterans Administration hospitals and other government organizations as a means of developing their own private telecommunications networks.

The microwave radios, made for Loral Terracom by Microwave Networks, Inc., are suitable for information transfer, range telemetry, high-resolution video and radar monitoring needs of military users, the vendor said. The MicroLink radios support a digital transmission rate of up to 45M bit/sec.

According to the vendor, the new MicroLink series offers a low-cost solution for government users' fixed station and portable requirements.

Loral Terracom, a division of Loral Corp., 9020 Baboia Ave., San

Diego, Calif. 92123, or call (619) 278-4100.

Package lets Mac retrieve from IBM PC

Compatible Systems Corp. recently announced a hardware/software package that lets an Apple Computer, Inc. Macintosh retrieve formatted text or graphics from an IBM Personal Computer on a Fox Research, Inc. 10-Net local-area network.

QuickShare, which consists of software, a half-slot card and a 5-ft cable, runs on an IBM Personal Computer XT, AT or compatible. The cable runs out to a Macintosh Plus, Macintosh SE or Macintosh II,

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Quickshare is available for a price of \$465.

Compatible Systems Corp., P.O. Drawer 17220, Boulder, Colo. 80308, or call (303) 444-9532.

■ X.25 packet assembler/disassembler announced

Develcon, Inc. recently announced the availability of a new switching X.25 packet assembler/disassembler that permits up to 64 asynchronous subscribers to communicate through dual, independent links with host mainframes and/or public data networks (PDN).

The dual link capability also enables customers to access two different X.25 facilities or to use both links to provide redundancy when accessing one facility. Operating reliability can be enhanced through the use of a fully redundant power supply, the vendor said.

The new product provides full switching capability among the connected asynchronous subscribers. X.25 control information can also be passed between X.25 devices.

The new X.25 PAD passes up to 150 packets per second and operates at an aggregate line speed of 128K bit/sec and, according to the vendor, fully supports 1980 CCITT X.25 recommendations as well as

the 1984 version of X.3, X.28 and X.29 for X.25 PADs. It is approved for operation on Tymnet, Telenet, Canada's DataPac and most European PDNs.

The X.25 PAD, fully featured and configured for installation, is priced at \$22,000.

Develcon, Inc., 6701 Sierra Court, Dublin, Calif. 94568, or call (415) 829-6200.

■ T-1 channelized test access unit introduced

Wiltron Co. has introduced a channelized test access unit for T-1 signals.

The **Model 9712 Digital Test Access Unit** performs hitless ac-

cess on voice frequency and digital data services within a DS1 (T-1) signal and features optional performance monitoring and alarm reporting.

The 9712, priced at \$4,655, accesses voice and data in the DS0, DS0A and DS0B formats and provides split access, a capability that works without affecting any other channel within the DS1 signal.

Wiltron Co., 490 Jarvis Drive, Morgan Hill, Calif. 95037, or call (408) 778-2000.

■ Corvus debuts version of operating system software

Corvus Systems, Inc. released a new version of its operating system software for local-area networks based on the Apple Computer, Inc. Macintosh personal computer.

The new networking package, designated **Constellation III**, is said to improve performance over the old Constellation II while making the system easier to use with menu-driven commands. Corvus said the program runs at a speed four times greater than Apple's AppleTalk and supports up to 64 stations.

Constellation III is tailored for the Macintosh but can also support MS-DOS computers, the Apple II series and Digital Equipment Corp. minicomputers, according to Corvus. The network software allows file transfer between Macintosh and non-Macintosh computers.

The new software allows storage in volumes up to 32M bytes.

Constellation III is priced at \$495. Constellation II users registered under Corvus's Software Subscription Service program will receive free upgrades.

Corvus Systems, Inc., 160 Great Oaks Blvd., San Jose, Calif. 95119, or call (408) 281-4100.

■ VT220 emulator links IBM PCs with DEC VAX

KEA Systems Ltd. recently announced a VT220 emulator that enables IBM Personal Computers, XT's, AT's and compatibles and the new IBM Personal System/2 to communicate with Digital Equipment Corp. VAX computers.

The **ZSTEM-VT220 Version 3.2** emulator provides true double-high/double-wide characters via Enhanced Graphics Adapter (EGA) and Color Graphics Adapter boards, 43-line mode and 132-column display via most EGAs, phone directory, DOS access and ASCII, Kermit and Xmodem file transfers. Data rates to 38.4K bit/sec are supported.

This version includes support for the Personal System/2 Graphics Array display adapter.

The ZSTEM-VT220 emulation software is \$150, and quantity and dealer discounts are available. Site, institution and corporate licenses are available.

KEA Systems Ltd., Suite 412, 2150 W. Broadway, Vancouver, B.C., Canada V6K 4I9, or call (800) 663-8702. ☐

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Opinions

T-1 MANAGEMENT

ANDRES LLANA JR.

Users need T-1 benchmark

Recently, there has been a strong movement among network users toward the implementation of T-1 carrier lines as a means of reducing operational costs. New multiplexers that offer network management functionality, dynamic bandwidth management, diagnostics and either a bit- or byte-interleaved architecture have moved in to fill this new niche.

But, with so many vendors seemingly offering the same product, how are product choices to be made? The lack of industry standard benchmark tests leaves network designers and managers without efficient, accurate means of determining the proper multiplexer for their needs.

While equipment pricing may once have been a determining factor, this is no longer true since product prices have come down and appear to be leveling off. Another way to measure the difference — maintenance costs together with maintenance programs — has also faded into the background.

That leaves network performance. However, how many vendors effectively present true system performance measurements in their proposals? Since most of the systems now on the market are relatively new assemblies, there is no component history and no means to confirm vendor claims. Users must be familiar with the detailed requirements of their networks in order to thoroughly under-

stand the impact that some multiplexer design concepts will have on them.

This is especially true if a proper multiplexer fit is to be made. One could argue that such a fit would be relatively easy to make, given the characteristics of the user's network. For example, users with predominantly voice nets could decide from among multiplexers with byte architectures, since the public networks are byte-oriented.

Vendors may not be quick to tell users, but there are performance factors that, over time, could significantly affect the cost-effectiveness of their networks. While a more rigorous analysis is warranted, consider the following issues. One very minor but important difference between a bit- and a byte-interleaved multiplexer can be found in bandwidth utilization. Some byte multiplexers use approximately 2% to 5% of the bandwidth of a T carrier for overhead functions.

Therefore, smaller networks designed around single T-1 links could exceed bandwidth availability during peak traffic periods. In cases in which the overflow rate exceeds 3% to 5%, such a user could be forced into the expense of additional bandwidth.

Another issue to consider is the impact that node processing, or the delay factor, can have on the cost of a net. In this situation, the delay factor — the time that a multiplexer takes to frame up information and pass it from the input to the output port — can be a significant factor in long-term cost.

Consider a five-node network. In reality, the rerouting of data through such a net

would involve not only the user nodes but the public network nodes through which the user's T-1 links are routed. This could result in rerouting not only through five but possibly 10 or more nodes. In a multidrop network, this delay factor can accumulate to the point at which network timeouts can develop.

Further, when subrates are at 9.6K bit/sec or lower speeds, the delay factor may not appear all at once but may evolve into network degradation. For example, in a large network of 700 to 800 low-speed polled terminals, operator terminal time would be a cost concern. The cost of a two-minute response delay during the busy hour for operators earning \$11.80 per hour could produce a cost penalty of 39 cents per operator. Assuming 800 operators, this amounts to \$312 per wait during a busy hour. Over the course of a year, this would amount to \$32,000, or \$160,000 over the average five-year life of the multiplexers.

As the examples illustrate, users contemplating the purchase of new multiplexers may not be getting the entire story from vendors, if they cannot establish parameters for network performance.

Today, with more network users putting all their eggs into T-1, the cost impacts over time can be significant for the user making the wrong choice. The user community needs to develop collectively a benchmark test program that, in turn, might be used to evaluate vendor equipment performance against a defined standard. □

Llana is director of consulting services for the Vermont Studies Group, Inc. of West Dover, Vt.

REGULATORY ROUNDUP

ALAN PEARCE

The trade imbalance

Despite strenuous objections from President Ronald Reagan, the U.S. Congress appears determined to pass a tough trade bill that could seriously limit imports of foreign-made telecommunications equipment into this country.

One of the major provisions of the trade bills that passed the House and Senate before the August recess is that imports of telecommunications equipment from countries should not be allowed into the U.S. unless exports of U.S.-manufactured telecommunications equipment are permitted into those same countries. Telecommunications is the only industry mentioned in the legislation.

If such a unified trade bill gets through the House-Senate conference this fall, the President has said that he will veto it. The President dislikes the fact that he will

Pearce is president of Information Age Economics, a telecommunications research firm in Washington, D.C.

be compelled to retaliate against countries refusing to import U.S. equipment by the use of tariffs or similar measures.

Nonetheless, it seems Congress has discovered an unforeseen aspect of the breakup of the Bell System. Since the 1984 divestiture of AT&T, the U.S. has confronted a growing trade imbalance in telecommunications equipment sales, which contrasts with the time before divestiture when the U.S. was a net exporter of such equipment. According to the latest data from the U.S. Department of Commerce, the U.S. exported \$2 billion worth of telecommunications equipment and imported \$4 billion last year.

Although there were more than 200 firms manufacturing telecommunications equipment in the early 1980s, the U.S. market was dominated by only four: AT&T, with a 68.4% market share; GTE Corp., with 11%; Northern Telecom, Inc., with 7.9%; and ITT Corp., with 3%.

In 1983, the year immediately prior to divestiture, the Bell oper-

ating companies purchased 80% of their equipment needs from Western Electric (now AT&T Technologies, Inc.). Last year, the BOCs purchased only 57.6% of their equipment from AT&T Technologies.

In 1983, the BOCs bought 6% of their switches from foreign suppliers, compared to more than 30% today. Only 5% of BOC transmission products were from non-U.S. companies in 1983; their share has risen to 25% today.

AT&T Technologies, dominant in all telecommunications manufacturing segments in the early 1980s, is now dominant only in central office and transmission gear. Its share of the key system market has slumped from 90% in the early 1980s to only 24.7% today. The major key system competitors come from Japan.

A similar slump has hit AT&T Technologies in the private branch exchange market, with its share falling from 80% early in the decade to about 25% today. Its com-

petitors in the PBX market are Northern Telecom, with a share of more than 19%; Rolm Corp., with 15%; Mitel Corp., 8%; NEC Corp., 8%; and Siemens AG, with 4%.

According to a recent report from the National Telecommunications and Information Administration (part of the Commerce Department), the following foreign-based companies have made significant market gains in the U.S. since the AT&T divestiture — from Japan: NEC, Fujitsu, Ltd., Hitachi, Ltd., Oki Electric Ltd., Toshiba Corp., Matsushita, Sumitomo Corp. and

Ideas won't keep; something must be done about them. Send them to *Network World* as a column for our opinions pages. Manuscripts must be letter quality, double-spaced and approximately 600 to 750 words in length. Disk and modem submissions are preferred. Columns should be timely, controversial, literate and accurate.

Contact Steve Moore, features editor, *Network World*, Box 9171, 375 Cochituate Road, Framingham, Mass. 01701, or call (617) 879-0700, ext. 732.

Opinions

► TELETOONS — By Phil Frank

I just knew it!
..More budget cuts
for the old
telecommunications
department!



Uniden; from Europe: Alcatel N.V., Siemens AG, Ericsson, Plessey-Stromberg-Carlson, Philips N.V. and Mitel Corp.-British Telecommunications plc; and Northern Telecom, Ltd. from Canada.

At the insistence of Congress, in late 1986, the Federal Communications Commission launched CC Docket 86-494, a Notice of Inquiry and proposed rule making, to examine the interrelationship of the FCC's regulatory policies with the telecommunications policies of foreign governments. The rule making followed the sending of a letter by then-FCC Chairman Mark Fowler to the seven regional Bell holding companies and to GTE asking them how much money the companies had spent and planned to spend buying telephone switching gear from Siemens AG. In his letter, Fowler expressed an increasing concern about fair and reciprocal treatment of U.S. telecommunications equipment manufacturers and service providers.

New FCC Chairman Dennis Patrick, in keeping with President Reagan's opposition to interference with trade issues, has cooled on the Fowler-initiated inquiry. Even so, Congress will not let go of the issue. In addition to pressing for

reciprocal open markets in Western Europe and Asia, Senate and House members are beginning to apply pressure on U.S. District Court Judge Harold Greene in his deliberations on business restrictions imposed on the RBHCs.

Leading members of Congress are beginning to note that barring the RBHCs from manufacturing telecommunications equipment is becoming costly and difficult for the government to defend. They point to the rapid deterioration of the U.S. trade balance in telecommunications equipment that has occurred since divestiture, saying it indicates that foreign suppliers have been the chief beneficiaries of the manufacturing restriction.

So, in the event that Judge Greene refuses to relent on the manufacturing prohibition, and if President Reagan vetoes the trade bill, we can expect early passage of a bill in the next session of Congress permitting the RBHCs to manufacture equipment. Although the RBHCs may initially be delighted, they may find themselves in difficulty with both Congress and the White House if they do not immediately solve the trade imbalance. And that might be a heavy burden to bear. □

CABLE MANAGEMENT

ALDO FALOSI

Don't tinker with cabling

Managers have talked about networking, connectivity, distributed processing, intelligent buildings and intelligence sharing, but until recently, few had implemented these concepts. This is, in part, due to the complexity of spreading information and computing power throughout a dispersed physical and logical system.

Many managers are enticed by the thought that a large data base existing on company mainframes could be taken apart, distributed to several dumb or intelligent workstations and logically linked with appropriate software. Unfortunately, most computer installations can't take full advantage of their computer resources because too little consideration was given to designing the cabling system.

In these organizations, data communications planning, which requires the same foresight as planning a computer architecture, is being addressed in a piecemeal fashion that creates havoc whenever system changes occur.

Two obstacles stand in the path of successfully implementing a data communications system. One is that cabling companies — typically an outgrowth of electrical contracting or telecommunications installation firms — often lack knowledge about data communications and business requirements. The other obstacle is that many companies still lack data communications expertise. Even communications managers, faced with a variety of proprietary cabling schemes, often lack the expertise to design a universal cabling system.

Primary attention often goes to lines, switches, port contenders, terminal servers and the like. Unfortunately, this focus on details tends to cover the real issue, which is to maintain speed, accessibility, flexibility, interchangeability and economy in an error-free environment.

Electrical contractors and telephone company installers must understand that it's a digital world today and that telephone wiring techniques will not work in the data communications world. While M66 punch blocks are great for voice band-

width, they perform poorly on a Wang Laboratories, Inc. Wang-Net operating at more than 2M bit/sec, for example.

The issue of what type of data network provides the best solution for large users is open to debate. Each manufacturer provides a different solution, and each claims its own advantages. However, each solution also has restrictions and limitations that aren't always clearly described.

Nynex Corp. recently evaluated data gathered from measurements made over a period of several months. The company discovered that decade-old, thin, nonshielded, twisted-pair wires, designed for analog (voice) waveforms over a frequency band of 50 Hz to 5 kHz, do not perform well at data communications frequencies of up to 200 Hz because of loss, noise and cross talk.

AT&T's much-touted Premises Distribution System is based on the use of existing nonshielded telephone wire. This is tantamount to suggesting that railway managers use old railroad track for today's high-speed trains.

Information must get from sender to receiver without seriously disturbing the train of square-wave pulses. As long as speeds are slow and distances small, any cable can handle this task.

When speeds increase to a point beyond a cable's electrical capabilities, wave distortion occurs. The outcome is errors, time delays and loss of information, which, more often than not, are all blamed on computer hardware or software, rather than on poor cabling. Unfortunately though, many organizations give low priority to data communications cabling and pay attention to it only when something goes wrong.

In designing a network scheme and selecting components, managers need to remember that the system is only as good as its weakest link. The key to reducing the impact of changes is through cabling flexibility and modularity.

With today's complex networks, buyers can no longer afford to simply look into a book and pick up a few tinker-toy pieces to assemble a system as complex as a 747. □

Falosi is executive vice-president of Cable Management Systems, Inc. in Irvine, Calif.

Product Focus: Packet-switching equipment

Charge of the packet brigade

New packet
product
capabilities
boost network
performance.

Features

September 14, 1987

BY JOHN J. HUNTER
Contributing Writer

New packet/circuit switches and other products and services slated for introduction in 1988 are poised to charge into the packet-switching market and revitalize it during the next three to four years.

Currently, the two principal components of packet networks are the packet assembler/disassembler (PAD) and the packet switch, or node. The PAD packetizes and depacketizes asynchronous or synchronous data, interfaces with the terminal or

Continued on page 31

Hunter is president of TMS Corp., a telecommunications consulting firm in Devon, Pa.

Packet switch vendors by market share
Chart 1



SOURCE: INTERNATIONAL DATA CORP., FRAMINGHAM, MASS.

Packet switches

Chart 2

Vendor	Product	Maximum lines/speed per line (bit/sec)	Maximum packet throughput per second	Maximum packet size (bytes)	Window size	Simultaneous virtual circuits	Protocols	X.75 support	X.121 support	Hunt groups	Call accounting per port				Price
											Call volume and duration	Statistics	Reverse charging	Network user identification	
Amnet, Inc. Framingham, Mass.	Nucleus 7400	20/64K	300	256	Modulo 128	200	IBM 3270, 2780/3780, SNA/SDLC, BSC, asynchronous		✓		✓	✓			\$15,250 (4 ports); \$4,875 each additional line
BBN Communications Corp. Cambridge, Mass.	C/3	12/64K	125	1,024	Modulo 8	512	HDLC, X.21 bis	✓	✓	✓	✓	✓	✓	✓	\$19K
	C/300	64/64K	900	1,024	Modulo 8	1,200	HDLC, X.21 bis	✓	✓	✓	✓	✓	✓	✓	\$87K (64 lines)
Dynapac Systems, Inc. Alexandria, Va.	Model 12	12/64K	128	128	Modulo 8	500	HDLC		✓	✓	✓	✓			\$13,975 (12 lines)
EDA Instruments, Inc. Toronto	ENX.2500	32/100K	300	128	Modulo 8	4,096	HDLC, synchronous		✓	✓	✓	✓	✓		\$4,810 to \$24K
Hewlett-Packard Co. Cupertino, Calif.	Model 80	288/19.2K asynchronous, 64K synchronous	2,000	128	Modulo 8	12,000	IBM 3270, 2780/3780, SNA/SDLC, BSC, asynchronous, synchronous		✓		✓	✓	✓	✓	\$35K to \$200K
M/A Com Telecommunications, Inc. Rockville, Md.	9000 Network Packet Exchange	640/64K	3,200	512	Modulo 8 and 128	18,432	HDLC, IBM 3270, 2780/3780, SNA/SDLC, BSC, asynchronous, synchronous	✓	✓	✓	✓	✓	✓	✓	\$29.5K to \$770K
Micom Systems, Inc. Simi Valley, Calif.	Box Type 3	12	50	256	Modulo 8	128	HDLC, X.25, LAP B		✓	✓	✓	✓	✓	✓	\$3,740 (6 lines); \$4,990 (12 lines)
Netrix Corp. Herndon, Va.	#1 Integrated Switching System	5,000/56K	2,400	4,096	Modulo 8 or 128	NA	HDLC, SNA/SDLC, BSC		✓	✓	✓	✓	✓	✓	\$12K and up
Northern Telecom, Inc. Raleigh, N.C.	DPN-50	4,000 inputs/56K; 16 trunks/192K	3,000	256	Modulo 8 or 128	10,000	SNA/SDLC, BSC, X.25 Level II, asynchronous, polled asynchronous	✓	✓	✓	✓	✓	✓	✓	NA
Paradyne Corp. Largo, Fla.	5222 Micronode	8/19.2K	NA	256	Modulo 8	60	HDLC, X.25 Level II, asynchronous, synchronous		✓	✓	Volume only	✓	✓	✓	\$8,500 (8 lines)
Protocol Computers, Inc. A Telematics International, Inc. Company Calabasas, Calif.	3000 Series	16/72K for 4, 9.6K for remainder	100	128	Modulo 8 or 128	448	HDLC		✓	✓	✓	✓	✓		\$6K (4 ports); \$10K (16 ports)
Siemens Data Systems, Inc. Hauppauge, N.Y.	Advanced Network Processor	256/19.2K	700	256	Modulo 8 or 128	4,096	HDLC, IBM 2780/3780, SNA/SDLC, LAP B, asynchronous, synchronous,	✓	✓	✓	✓	✓	✓	✓	\$10K (4 ports); \$40K (128 ports)
Telenet Communications Corp. Reston, Va.	TP4-4850	224/64K	1,800	1,024	Modulo 128	2,500	IBM 2780/3780, SNA/SDLC, HASP, X.32 (dial-In), X.25 Level II, asynchronous	✓	✓	✓	✓	✓	✓	✓	\$74.5K (8 lines); \$350K (244 lines)
Telematics International, Inc. Ft. Lauderdale, Fla.	Series 200	34/64K	100	128	Modulo 128	4,095	HDLC, SNA/SDLC, BSC, asynchronous, synchronous	✓	✓	✓		✓		✓	\$15K (34 lines)
Tellabs, Inc. Lisle, Ill.	331 Xplexer	32 Inputs/9.6K; 18 trunks/76.8K	2,500	128	Modulo 8 or 128	256	HDLC, BSC, bit synchronous		✓	✓	✓	✓	✓	✓	\$2,500 (2 lines); \$4,900 (32 lines and 2 links)
Tymnet/McDonnell Douglas Network Systems Co. San Jose, Calif.	Dual-Mini	128/9.6K asynchronous or 64K synchronous; 32/74K	NA	128	Modulo 8 or 128	1,024	X.25 Level II, IBM 3270, 2780/3780, SNA/SDLC, BSC, asynchronous, polled asynchronous	✓	✓	✓	✓	✓	✓	✓	\$40K to \$100K
	Micro-Engine	24/9.6K asynchronous or 19.2K synchronous; 8 trunks/19.2K	NA	128	Modulo 8 or 128	1,024	X.25 Level II, IBM 3270, 2780/3780, SNA/SDLC, BSC, asynchronous, polled asynchronous	✓	✓	✓	✓	✓	✓	✓	\$10K to \$25K

BSC = Binary Synchronous Communications
HDLC = High-Level Data Link Control
LAP B = Link Access Procedure B
NA = Not available
SDLC = Synchronous Data Link Control
SNA = Systems Network Architecture

NOTE: Products listed are representative for each vendor. Many vendors offer other systems that could not be included due to space constraints. Readers should contact vendors directly for more information.

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workstation to perform protocol conversion and speed conversion services, appends control informa-

tion to packets and transmits them to a switch for transmission through the network.

This current packet-switching

topology will change, however, as a new breed of products enters the market. The most popular entry will be a combined packet/circuit

switch that integrates both types of switching in one box. Another product will be a switch that han-

Continued on next page

Packet assembler/disassemblers

Chart 3

Vendor	Product	Maximum ports/speed per port (bit/sec)	Maximum trunks/speed per trunk (bit/sec)	Protocols	Buffer size (bytes)	Simultaneous virtual clrcuits	Maxlimum packet size (bytes)	Window size	Packet network certification	Price
Amdahl Corp. Richardson, Texas	4400 Series	40/19.2K asynchronous or synchronous	2/56K	Asynchronous, synchronous, IBM 2780/3780, SNA/SDLC, HDLC, LAP B	512K	500	256	Up to 7	1, 2, 3, 4 and 5	\$7,000 to \$14,000
Atlantic Research Corp. Springfield, Va.	XPERT	2/Bus speed of IBM personal computer	1/38.4K	Asynchronous, IBM 3270, BSC, LAP B	NA	4; up to 60 optional	256	Up to 7	2, 3, 4, 5 and 9	\$1,295
Digital Communications Associates, Inc. Alpharetta, Ga.	DPAX	80/19.2K asynchronous	1/72K	HDLC, LAP B	32K	80	4,096	Up to 7	NA	\$4,495 (80 lines)
	X.25 PAD	32/9.6K	1/4.8K	HDLC, LAP, LAP B, BSC, Datapac Standard Network Access	15K	33	4,096	Up to 7	1 through 13	\$2,195 (2 lines); \$8,845 (32 lines)
Dynapac Systems, Inc. Alexandria, Va.	PAD 116	16/9.6K asynchronous	1/14.4K	HDLC, LAP, LAP B	22K	17	256	Up to 7	1 through 13	\$5,550
EDA Instruments, Inc. Toronto	MPX.25000	32/19.2K asynchronous or synchronous	10/100K	HDLC, LAP, LAP B, Unisys Corp.'s Uniscope and Poll/Select, Qantel QSP, Hewlett-Packard Co.'s ENQ-ACK	128K	32 asynchronous; 135 synchronous	256	Up to 7	1 through 12	Up to \$15,000
Elcon Technology Corp. Montreal	Network Adapter Access/X.25	1/Bus speed of IBM Personal Computer AT	1/64K	HDLC, LAP B	1,024K	128	256	Up to 7	1 through 10	\$995 stand-alone plug-in personal computer board w/ltl single user; \$1,695 for 8 users; \$2,695 for more than 8 users
Gandalf Data, Inc. Wheeling, Ill.	XMUX	32/19.2K asynchronous	2/64K	HDLC, LAP, LAP B	32K	32	128	Up to 7	2, 3 and 4	\$2,195 (4 ports); \$9,390 (32 ports)
Hewlett-Packard Co. Cupertino, Calif.	HP 2334A Plus	16/19.2K asynchronous	1/19.2K	HDLC, LAP B, X.21 bis	20K	16	128	Up to 7	1 through 12	\$3,150 (4 ports); \$5,700 (16 ports)
Integrated Network Systems, Inc. Mobile, Ala.	INS-X.25 PC Adapter	1/Bus speed of IBM personal computer	1/19.2K	HDLC, IBM SNA/SDLC	128 or 256	none	128 or 256	Up to 7	2, 3, 4, 5, 8, 10 and 12	\$995
Micom Systems, Inc. Simi Valley, Calif.	Box Type 3	16/9.6K asynchronous; 19.2K synchronous	1/72K	X.25 Level II, SNA/SDLC or IBM 3270 BSC (no protocol mixing permitted), LAP B	NA	18 asynchronous; 64 synchronous	256	Up to 7	1, 4, 5, 6, 8, 9 and 10	\$2,290 asynchronous (4 ports); \$4,790 asynchronous (16 ports); \$3,740 BSC (4 ports maximum); \$4,740 SDLC (4 ports maximum)
Microtronix Systems Ltd. London, Ontario	CSI-8.25	16/19.2K asynchronous	2/19.2K	HDLC, LAP, LAP B	392K	18	256	Up to 7	2, 3, 4 and 5	\$225 per port
Northern Telecom, Inc. Raleigh, N.C.	DPN-10	104/56K asynchronous or synchronous	6/56K	SNA/SDLC, BSC, X.25 Level II, asynchronous, synchronous, polled asynchronous	1M	5,000	256	Up to 7	2 through 13	NA
Paradyne Corp. Largo, Fla.	5220 Sync PAD	3/19.2K synchronous	1/19.2K	HDLC, LAP B, SNA/SDLC, IBM 3270, 2780/3780	32K	9	256	Up to 7	2, 3, 5, 9 and 10	\$2,900
Protocol Computers, Inc., A Telematics International, Inc. Company Calabasas, Calif.	2000 Series	27/9.6K asynchronous	4/64K on 1; 9.6K on the others	HDLC, LAP, LAP B	200K	120	1,024	Up to 7	1 through 10	\$4,500 (4 ports); \$6,500 (27 ports)
Protocom Devices, Inc. New York	P 2500	4/19.2K synchronous	1/19.2K	HDLC, LAP, LAP B, SNA/SDLC IBM 3270, 2780/3780, Unisys' Uniscope and Poll/Select, Honeywell, Inc.'s VIP 7700	32K	44	256	Up to 7	1, 2, 3 and 4	\$6,500
Siemens Data Systems, Inc. Hauppauge, N.Y.	Advanced Network Processor	256/56K	6/56K	Asynchronous, IBM 3270 BSC, SNA/SDLC, 2780/3780, LAP, LAP B	NA	4,095	256	Up to 7	NA	\$10,000 (4 ports); \$40,000 (128 ports)
Telenet Communications Corp. Reston, Va.	TP 3-II-3325	52/19.2K asynchronous on 48 ports; 64K synchronous on 4 ports	2/64K	Asynchronous, IBM 3270 SNA/SDLC, BSC, SNA/DSP, 2780/3780	256	160	256	Up to 7	2, 4, 5, 6, 7, 9 and 10	\$8,500 (4 ports); \$19,000 (52 ports)

1. AT&T's Accunet
2. Telenet Communications Corp.'s Telenet and Uninet
3. Tymnet/McDonnell Douglas Network Systems Co.'s Tymnet
4. Canada's Datapac
5. UK's PSS
6. Austria's Austpac
7. Belgium's DCS

8. Finland's Datapak/Diglpak
9. France's Transpac
10. West Germany's Datex-P
11. Ireland's Elrpac
12. Israel's Isranet
13. Italy's Itapac

- BSC = Binary Synchronous Communications
- DSP = Display Systems Protocol
- HDLC = High-Level Data Link Control
- LAP = Link Access Procedure
- LAP B = Link Access Procedure B
- NA = Not available
- SDLC = Synchronous Data Link Control
- SNA = Systems Network Architecture

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From previous page
dles packet switching and Integrated Services Digital Networks routing; still another will be a T-1 multiplexer that sports an ISDN interface.

Combined packet/circuit switches are being developed by every major vendor and will appear by late 1988, according to market research firm Dataquest, Inc. in San Jose, Calif. The most publicized efforts are from BBN Communications Corp., Telenet Communications Corp. and Netrix Corp. BBN's product will combine its current C-series packet switches with its NSS N16 T-1 circuit switch. Telenet is considering teaming up its TP4 series packet switches with Timeplex, Inc.'s Link/2 T-1 multiplexers. Netrix's product, rather than combining existing products, will be produced from a new design but has yet to reach beta testing.

The concept of a packet/circuit switch is interesting, but one question keeps popping up: How good will the network control be? Probably not good at all, according to Tim Zerbiec, vice-president of Vertical Systems, Inc. a Dedham, Mass.-based consulting firm. "Developers concentrate their efforts initially on solving connectivity problems and place less emphasis on net management. However, that's extremely important to the user. If network management facilities aren't as good as what's available with current separate products, vendors will have problems selling them."

If the past is any indication, Zerbiec says, network management will take a back seat in the product development cycle.

Jim Herman, an independent consultant in Cambridge, Mass., adds, "Network management seems to be a second order of priority with many developers, but it's paramount for network managers." Herman says managers want network tools that let them make decisions in real time and allow reconfiguration to take advantage of circuit capacity. The combined switch's management system will have to provide first-rate facilities, he states.

The concept of a packet/circuit switch is interesting, but one question keeps popping up: How good will the network control be? Probably not good at all, according to Tim Zerbiec, vice-president of Vertical Systems, Inc.

Victoria Marney-Petix, an industry analyst at Dataquest, agrees there's a need for top-flight packet network management but predicts that the facilities in the Telenet/Timeplex product will "have more functionality than any stand-alone product on the market."

Another alternative for users

seeking powerful switching facilities may be T-1 multiplexers that interface with ISDN and are equipped for packet switching. Such products could attain greater multidrop capabilities and thus extend the reach of T-1 multiplexers beyond typical point-to-point links. However, that marriage will be rocky at first, due to the signaling incompatibilities of packet products, T-1 multiplexers and ISDN.

"Handling the call setup and solving the signaling problems won't be easy and will likely require a two-part call, one for the T-1 and one for ISDN," Zerbiec says. "A bridge will probably be needed."

Herman agrees. "The call setup and signaling to link the two will be a major software task and will be extremely complicated. Some T-1 vendors may try to solve it internally; others might go to a bridge," he says.

Lew Stilp, manager of industry marketing for ISDN products at Infotron Systems Corp. in Cherry Hill, N.J., confirms that a two-part call will be necessary for the next two to four years. By that time, Stilp anticipates, a common signaling standard will have evolved.

T-1 multiplexers that interface with Integrated Services Digital Network and are equipped for packet switching could attain greater multidrop capabilities and thus extend the reach of T-1 multiplexers beyond typical point-to-point links.

"The T1D1 committee of the Exchange Carrier Standards Association is discussing signaling standards now," he says.

Other products with the potential to change the packet-switching market are board-level PADs being marketed by Atlantic Research

port prices below \$1,000. Eicon offers a version of its Network Adapter Access/X.25 at \$336 per user. According to Dataquest, board-level PADs accounted for 13% of the market in 1986 and will capture 40% by 1991. "They will replace the stand-alone asynchronous PAD as a key market player,"

Recently released Dataquest estimates show an expected drop in the market value of PADs shipped in the U.S., from \$46.1 million in 1987 to \$38.8 million in 1991, due to competition from low-cost, board-level products.

Marney-Petix says.

New packet-switching products, along with increased sales of existing products in new markets, might bring on good financial times for packet-switch vendors but may also adversely affect PAD sellers. Recently released Dataquest esti-

establishing virtual circuits, transmission windows (the number of packets that can be transferred between data terminal equipment before an acknowledgment is required), variable packet size, closed user groups and a new access protocol called Link Access Procedure B (LAP B), a bit protocol

that separates user data and special protocol sequences.

The 1984 recommendation added a number of useful facilities, including X.21 access, passwords for accessing communications ports and X.32 support. The latter is used with the direct dial-up network and specifies dial-in and dial-out access, long-distance access, telex and backup for leased lines.

Optional facilities include hunt groups, which distribute incoming messages, and network user identification, which accommodates user identification, billing and on-line facilities registration. The latter also allows users to communicate with the public packet networks to change their subscription parameters.

Of the vendors in the comparison charts, only Northern Telecom, Inc., Dynapac Systems, Inc., Eicon, Gandalf Data, Inc., Microtronix Systems Ltd., EDA Instruments, Inc. and Siemens Data Systems, Inc. claim 1984 conformance; and only Siemens and Telenet support X.32. The other vendors conform predominantly to the 1980 recommendation, although a few have implemented some 1984 features such as hunt groups and network user identification.

The PADs in Chart 3 (except the personal computer plug-in boards) are multiport units that let many devices share PAD facilities and concentrate their inputs over a single dedicated or dial-up line. PADs connecting to the public packet services will, in most cases, require certification by the user's service provider. The chart lists the 13 most frequently mentioned packet-switching services on which PAD vendors claim to be certified. This list is by no means exhaustive, however, since packet networks that have different requirements exist in many foreign countries.

Because of the way they're priced, public packet services aren't always the best vehicles for users' applications. "We advise our customers to discuss all charges thoroughly before signing up with the service because some applications won't be cost-effective," says Mike Brown, Digital Communica-

mates show an expected drop in the market value of PADs shipped in the U.S., from \$46.1 million in 1987 to \$38.8 million in 1991, due to competition from low-cost, board-level products.

Whether users are subscribers to a public packet network or are constructing their own private network, many reasonably priced products are available. Products that incorporate an X.25 interface solely to link up with other X.25 devices are not included in the charts. Many multiplexers, for example, have an X.25 interface for that purpose.

Terminals and computers that attach to the public packet network must comply with the CCITT's X.25 recommendation, which defines three functional layers and a myriad of services. Layer 1 defines the physical interface (RS-232-C, for example); Layer 2 defines the data link protocol (High-Level Data Link Control); and Layer 3 provides procedures for routing between users and controlling data flow.

The first X.25 recommendation appeared in 1976 and specifies the Link Access Procedure (LAP) protocol. The next version, released in 1980, includes specifications for

tions Associates, Inc.'s product manager for network products.

One factor influencing transmission charges is whether the service provider differentiates between dedicated and shared packets. With dedicated packets, all data is addressed to one user and the packet is rarely full. Shared packets contain data from several users and are usually full. Packet service providers charge users by the kilopacket or kilocharacter.

If a provider charges dedicated users by the kilopacket and shared users by the kilocharacter, users sending only a few characters per

nets also have specific criteria for the way the data field is constructed that might pose a problem for some users' applications.

Users contemplating purchasing packet switches should ask some difficult questions about how vendors determine packet throughput and packet delay through the switch. Some count packets in and packets out, while others count the packets once (Micom Systems, Inc.'s Box Type 3 is an example of the latter). Some switches count only packets that are full length, while others figure short packets into the throughput rating.

With dedicated packets, all data is addressed to one user and the packet is rarely full. Shared packets contain data from several users and are usually full. Packet service providers charge users by the kilopacket or kilocharacter.

transmission might be better off using a shared packet service. Conversely, users sending many full packets might be better off with a dedicated service. Some packet

Packet delay time will determine whether the node can keep the transmission link full at all times. Delays can also wreak havoc with time-sensitive protocols such as

IBM's Binary Synchronous Communications. Most vendors begged off this time issue, saying that too many variables were involved to give an accurate number. However,

ucts. Northern Telecom, for example, is working on a product that will do packet switching and ISDN routing, according to Dataquest. Northern Telecom confirms this,

Combined packet switch/circuit switch products will be targeted at existing larger networks to allow them to combine what are now two separate functions, while lower cost packet switches will be introduced to appeal to smaller companies.

typical delay times range from 10 to 100 msec.

In summary, the PAD and packet-switch markets will soon see some changes in the pricing and positioning of existing products as vendors attempt to penetrate non-Fortune 1,000 companies. Combined packet switch/circuit switch products will be targeted at existing larger networks to allow them to combine what are now two separate functions, while lower cost packet switches will be introduced to appeal to smaller companies.

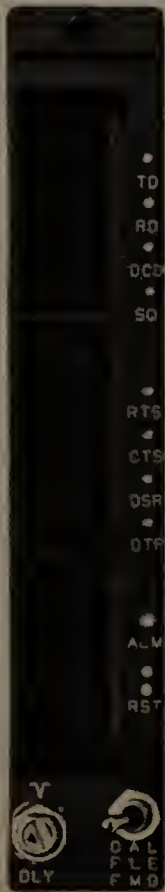
As for ISDN, equipment vendors are working on compatible prod-

and says the product should be announced by the end of September.

What might frost the forecast for private and public packet networks are national packet-switching services currently being readied by the regional Bell holding companies. Whether or not the RBHCs can all agree on one set of procedures, however, is questionable. If the RBHCs get their act together, packet-switching equipment vendors will be looking over their shoulders. Meanwhile, services like Tymnet and Telenet are here today, provide extensive connectivity and are well-managed. ☐



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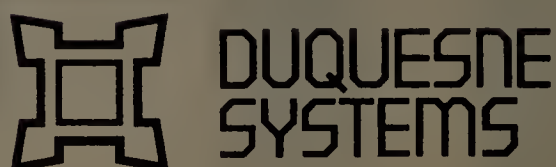
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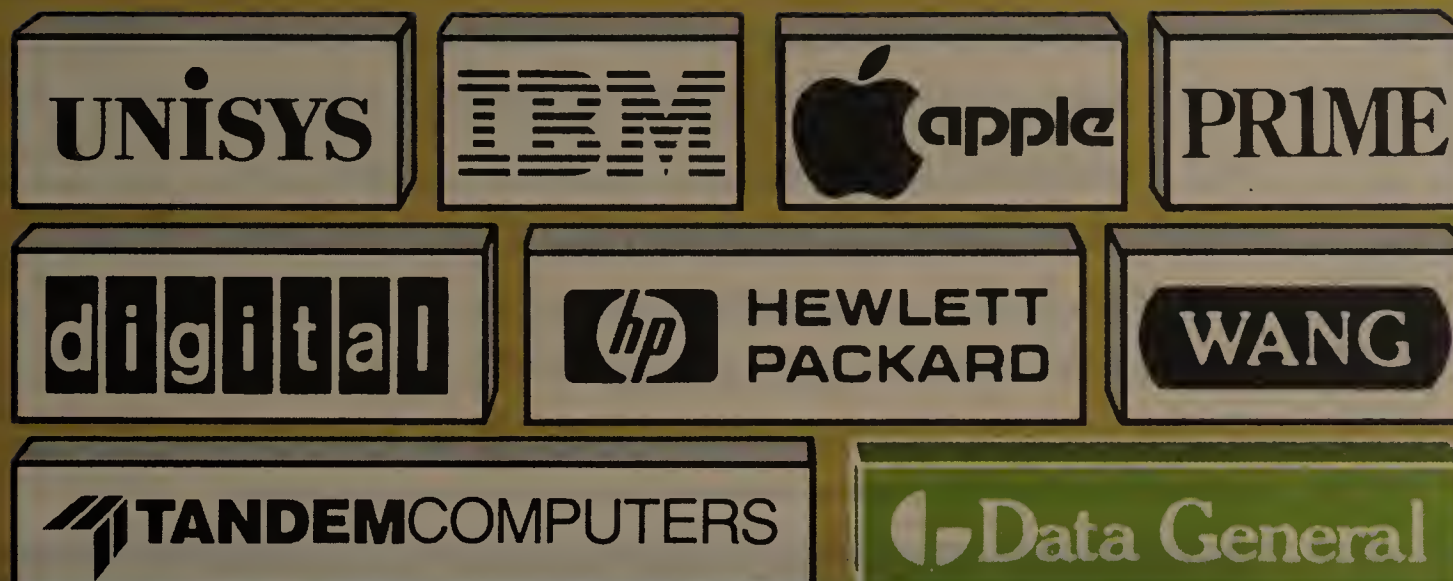
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Open Systems: How open are they?

A generation migrates

Continued from page 1

Open Systems Interconnect (OSI) compliance. At the same time, DG indicated its ongoing commitment to support de facto standards — namely, IBM's Systems Network Architecture — and introduced PC*I, a network plan integrating IBM Personal Computers and compatibles into DG's product family.

According to Colin Crook, senior

King is a free-lance writer based in the Philadelphia area.

vice-president of DG's year-old Communications Systems Group, the company's stepped-up emphasis on communications recognizes commercial realities.

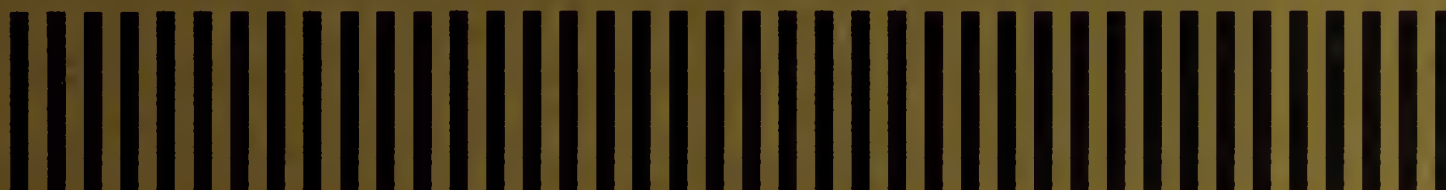
"Ultimately, we're in business to make a profit," Crook says. "Therefore, our strategy had to be a response to what the marketplace wants. And the last thing it wants is anything proprietary."

Crook says users are seeking practical communications solutions, allowing straightforward connections between DG equipment and that of its competitors.

Such solutions demand that DG not only support emerging open systems standards but also that it aggressively support the IBM world.

"OSI and SNA must coexist, and Data General will place emphasis on the optimal reconciliation of the two from an information network viewpoint," Crook says. "Whether a customer is committed to OSI or SNA, Data General will provide integrated application and system services so that as a customer's information needs change, we can accommodate the changes."

Continued on next page



From previous page

DG's new PC*I product provides a prime example of DG's twin axis strategy of aggressively implementing SNA while tying in OSI, according to Crook.

Within PC*I's networking architecture, users have a choice of running 802.3 Ethernet, ThinWire Ethernet or Starlan at Layer 1 of the OSI model. At Layer 2, DG supports 802.2. Higher up, DG has implemented the International Standards Organization's (ISO) internet protocol (IP) at Layer 3 and transport protocol (TP) at Layer 4, via its Workstation Transport System (WTS) on the terminal side and its Xodiac Transport System (XTS) on the host side. Network Basic I/O System provides the standard application interface within the new network architecture, thus allowing users to run any application written to IBM's own PC Network.

"The nice thing about the PC*I product and the reason that it's significant is that the first four layers correspond directly to OSI's layers," says Tom Sullivan, a senior network consultant with DG. "Also, the NETBIOS interface allows us to run all of the standard applications."

Getting in step

While significant for DG, PC*I is considered something of a catch-up

Within PC*I's networking architecture, users have a choice of running 802.3 Ethernet, ThinWire Ethernet or Starlan at Layer 1 of the OSI model.

product by many analysts, who note that the company's competitors, including Digital Equipment Corp. and Hewlett-Packard Co., have accommodated IBM intelligent workstations on their networks for some time.

"DG is a little — no, a lot — late to the party with a PC LAN," says Marty Gruhn, vice-president of The Sierra Group, a Tempe, Ariz., office automation consulting firm. Still, Gruhn sees DG's new communications strategy as a step in the right direction.

So does John McCarthy, director of professional automation services at Forrester Research, Inc. in Cambridge, Mass. "DG earns poor marks in the area of PC connectivity and LANs," McCarthy says. But standing out in sharp contrast to

those poor marks is the company's better-than-average track record in overall IBM mainframe connectivity, where McCarthy says DG has outdistanced DEC, HP and Wang Laboratories, Inc. Specifically, he

applauds DG's XTS/SNA backbone software, which allows DG systems running Xodiac networking software to communicate over an IBM SNA network.

While it remains to be seen

"DG earns poor marks in the area of PC connectivity and LANs," says John McCarthy, director of professional automation services at Forrester Research, Inc. in Cambridge, Mass.

whether PC*I will assist DG in winning new customers, the product has already helped the company retain at least one potential defector, the Los Angeles law firm of Paul, Hastings, Janofsky and Walker.

According to manager of information systems Mark Cartier, the firm was looking "fairly seriously" at switching over to DEC gear until PC*I came along. In fact, it was because of PC*I that the firm decided to stick with DG equipment.

"When we made the commitment last year to put [IBM Personal Computers] on every desk, DG had nothing that would allow them to talk to our [DG] MV processor," Cartier recalls. "We looked at DECnet and were considering replacing



When connecting different communications systems, it's best to put all your eggs in one basket.

our MVs with VAXes when Data General approached us with the PC*I product."

Cartier reports no major snags with the PC*I networking system, which has been running over Starlan in beta operation at the law firm since February. He applauds DG for its high level of support and service, adding that the law firm's plans call for networking 300 to 500 additional personal computers using PC*I once DG begins shipping boards later this fall.

While DG may have lagged in the personal computer networking arena, the company has been faster out of the gate when it comes to linking more sophisticated machines within the SNA framework. In addition to supporting Docu-

ment Interchange Architecture, Document Content Architecture, DISOSS, Professional Office System and SNA Directory Services via its Comprehensive Electronic Office automation product, DG's

XTS/SNA lets DG systems running Xodiac networking software communicate with one another in an IBM SNA environment.

The company also supports PU 2.1 and LU 6.2, which allow for

peer-to-peer communications. Using DG's LU 6.2 product, users can establish sessions between a subsidiary DG station and an IBM mainframe. This is generally used in a DISOSS environment. Additionally, DG offers a complete suite of IBM emulation capabilities, including 3270, 2780, 3780, HASP, 3770 Remote Job Entry and 3289 printer emulation.

Solitary duty

Despite the availability of IBM interconnect products, many DG users continue to operate the company's equipment as stand-alone systems within multivendor environments.

Agway Data Services, a subsidiary of Syracuse, N.Y.-based Agway, Inc., is such a user. Gary Friedman, vice-president of development services at Agway, says the company continues to run isolated applications on MVs in 40 plants because it uses older DG Desktop 10 terminals that simply "don't connect well" to its MVs or to Agway's IBM mainframe.

As a result, Agway must poll all of the terminals located in the plants each night. System users send data first from the terminals to the MV, using DG's XAP software. Data is then sent to the IBM mainframe, using a DG-developed ASCII-to-EBCDIC converter.

DG supports PU 2.1 and LU 6.2, which allow for peer-to-peer communications. Using DG's LU 6.2 product, users can establish sessions between a subsidiary DG station and an IBM mainframe.

"I'll give them a mark for the converter, but we still had to put a piece of DG equipment in our computer room because it was the only way to talk to the desktops," Friedman says, adding, "It would be much better not to have that box."

At Academy Insurance Group in Valley Forge, Pa., John Walton, systems manager for technical support, says linking its two DG MV 10000s with the company's National Advanced Systems (NAS) mainframe is "too expensive and too much of a headache."

"It's possible, but we just couldn't cost-justify it," he says. As a result, Academy maintains its accident and health insurance data on its DG system while running ap-

Continued on next page

While DG may have lagged in the personal computer networking arena, the company has been faster out of the gate when it comes to linking more sophisticated machines within the SNA framework.

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From previous page
plications for its life insurance business on its NAS system. DG's Blast file-transfer software, licensed from Communications Research Group, Inc. in Baton Rouge,

"All of us are, of course, going to say that we're OSI-compatible, but all of us are going to interpret OSI compatibility as a business strategy. If we don't do that, I think we're all being extremely naive," Crook says.

La., allows data exchange between the two systems.

A second factor dictating Academy's use of dual systems is its use of insurance business software developed on a DG system.

"The software was written in DG COBOL, and there is no easy conversion path between DG COBOL and IBM COBOL. Basically, if you bought the DG software, you pretty much had to go with Data General equipment," Walton says.

Open strategy

On the OSI front, DG supports Layers 4 and below with what DG's Crook refers to as several "flavors" of implementations that are contained within the model.

"The real issue about OSI is whether we can actually build systems with it as opposed to implementing portions of the model," he says. "The problem facing us, of course, is that OSI isn't a matter of a complete stack. Within the stack itself are various flavors at each level."

As a result, he says, users can expect that "a lot of games will be played" by all vendors in terms of OSI-compatibility. "All of us are, of course, going to say that we're OSI-compatible, but all of us are going to interpret OSI compatibility as a business strategy. If we don't do that, and we think it's merely a technical issue, I think we're all being extremely naive," Crook says.

He adds that DG's OSI strategy is to implement the model in very specific and practical ways, which means layering ISO protocols at the transport layer and then using de facto standards to operate at the upper layers.

"Our strategy is to go af-

ter selected vertical implementations of the OSI model and then broaden that when specifications become more available," he says. Again, Crook points to PC*I as a prime example of this strategy in action.

A second example of DG's strategy to combine industry and de facto standards is its handling of network management, Crook says. He notes that DG will accommodate IBM's NetView network management scheme within its own architecture.

"Our emphasis on network management is to make sure we can interface with NetView," according to Crook. "We're designing our products to migrate toward NetView support so that the customer can do network management under DG's network scheme, which will also be OSI-compliant." DG anticipates accommodating NetView within the next 12 months.

Crook sees this as an edge over competitors. "I believe DG can position itself, as far as the customer is concerned, as a valuable contributor to the development of realistic open systems. And, to me, realistic means recognizing the reality of the marketplace — however much we don't like it."

Within the OSI model, DG currently supports 802.3 and 802.4 standards at Layers 1 and 2. Higher up, DG supports X.25, X.29 and X.400. The company plans to support 802.5 token-ring standards, OSI/File Transfer and Access Method, Technical and Office Protocol and Manufacturing Automation Protocol 3.0. DG is testing MAP 2.1 products in-house but has not yet shipped any to customers.

The company is much further along with its X.400 product, demonstrated this past spring at the Hannover Faire with equipment from DEC, Honeywell Bull AG and ICL North America.

In addition, DG is beta testing its X.400 interface with Telenet Com-

"We're designing our products to migrate toward NetView support so that the customer can do network management under Data General's network scheme, which will also be OSI-compliant," according to DG's Crook.

munications Corp. customers.

Crook says X.400 will also play a role in the company's planned support for X.12, noting that, because X.12 will most likely be based on X.400, it's "safe to say

DG will be supporting Electronic Data Interchange."

Currently, DG is supporting the Department of Defense's Transmission Control Protocol/IP to provide
Continued on page 40

Data General Corp. connectivity

Chart 1

Connectivity provided by DG

Apollo Computer, Inc.

- TCP/IP

Apple Computer, Inc.

- DG/Blast — enables asynchronous file transfer over dial-up or dedicated telephone lines

Cray Research, Inc.

- Hyperchannel

Digital Equipment Corp.

- CEO Document Exchange III
- DG/X.400
- TCP/IP

Hewlett-Packard Co.

- DG/X.400
- TCP/IP
- DG/Blast
- IEEE-488-bus — factory and scientific networking bus standard

IBM

- DG/PC*I — connects IBM Personal Computers and Eclipse/MV servers using IEEE 802.3 thick, thin or Starlan configurations
- CEO Connection — supports asynchronous file transfer between an IBM Personal Computer and an Eclipse/MV host running CEO software.
- DG/SNA — allows Eclipse computers to appear as an SNA PU 2
- DG/SDLC — provides protocol capabilities for access to IBM systems using SNA
- XTS/SNA (backbone software) — lets DG systems running Xodiac networking software communicate over an IBM SNA network
- X.25 Data Link Control Software — allows users to access SNA networks via X.25
- DG/Blast
- CEO Document Exchange Architecture — 1) allows a DG system with CEO to emulate an IBM office system node; 2) lets CEO users exchange documents and mail with DISOSS users; 3) lets CEO users store and retrieve documents in the DISOSS central library; 4) converts documents on the DG system, without demand on the IBM host; 5) uses IBM's SNADS, DIA/DCA, PU 2.1 and LU 6.2 distributed network architectures
- PROFS — supports exchange of electronic mail and documents between CEO and PROFS using DISOSS Exchange Architecture
- RJE80 — IBM 2780 or 3780 Remote Job Entry station emulator
- RCX70 (IBM 3271 Remote Cluster Executive) — lets Eclipse systems emulate an IBM 3271 cluster controller
- HASP II — IBM HASP II RJE workstation emulator
- SNA/3270 — emulates the IBM 3270 Information Display System in a DG DG/SNA environment. Also lets DG users access an IBM host directly from their DG workstation. In addition, SNA/3270 lets an appropriate DG terminal appear as an IBM 3278 terminal to the SNA network
- Future:
 - IBM Token-Ring local-area network

Prime Computer Inc.

- TCP/IP

Sun Microsystems, Inc.

- TCP/IP
- DG/UX — includes an implementation of Sun's Network File Systems

Tandem Computers, Inc.

- CEO Document Exchange
- DG/Blast
- DG/Gate — terminal-emulation software
- TCP/IP

Unisys Corp.

- TCP/IP
- BSC
- SNA/3270 emulator

Wang Laboratories, Inc.

- CEO Document Exchange I — lets DG systems with CEO exchange documents with Wang word processing systems

Connectivity provided by third-party vendors

Cullinet Software, Inc.

- Information Data Base — lets CEO users access information in a Cullinet Information Data Base via an SNA link. Also links DG systems to Cullinet Information Data Bases running on an IBM mainframe

KAZ Business Systems, Inc.

- FrontEnd — provides a Macintosh interface to minicomputers and mainframes

BSC = Binary Synchronous Communications
CEO = Comprehensive Electronic Office
DCA = Document Content Architecture
DIA = Document Interchange Architecture
PROFS = Professional Office System
SDLC = Synchronous Data Link Control
SNA = Systems Network Architecture
TCP/IP = Transmission Control Protocol/Internet Protocol
XTS = Xodiac Transport Services



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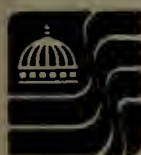
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NWWC

DG's Sullivan says the company's plans to migrate its Xodiac architecture to OSI compliance eventually call for an enhancement to its X.25 product, which will migrate from 1980 specifications to 1984 specifications. This will allow DG to use Network Service Address Points for addressing.

From page 38
functionality for Layers 4 and up. Users can run traditional TCP/IP applications such as Telnet, File Transfer Protocol and Simple Message Transfer Protocol using Xodiac application services. These services comprise what DG refers to as "agents" and include DG's Resource Management Agent, Virtual Terminal Agent, File Transfer Agent and Remote Database Management Agent.

DG's Sullivan says the company's plans to migrate its Xodiac architecture to OSI compliance eventually call for an enhancement to its X.25 product, which will mi-

ument Exchange I, which allows DG systems to exchange documents with Wang word-processing systems and lets users mail documents via Wang's Mailway.

DG's Blast file-transfer software provides connection to systems from HP, Tandem Computers, Inc., Apple Computer, Inc. and IBM, while TCP/IP offers links between DG machines and those from Unisys Corp., Sun Microsystems, Inc., Apollo Computer, Inc., HP, Prime Computer, Inc. and Tandem Computers.

Opening the lines
Given DG's new aggressive

stance in opening up its network architecture, Crook says, third-party vendors can expect the company to be increasingly communicative about publishing its specifications. He emphasizes that DG is eager to work with third parties "because this is how we're going to achieve true open information networks."

Most recently, DG entered into a strategic alliance with Bridge Communications, Inc., a Mountain View, Calif., manufacturer of local-area network products based on 802.3, 802.5 and broadband technologies. The agreement calls for the two companies — possibly in

conjunction with 3Com Corp., with which Bridge recently merged — to jointly develop and market local-area networking equipment for DG systems.

According to Judith Estrin, Bridge's cofounder and vice-president of engineering, Bridge has been working with DG on products "that tie into OSI." Prior to the agreement, which was announced this past July, Estrin says Bridge never attempted to be compatible with DG's proprietary Xodiac network. The reason, she adds, is that "historically, their networks have not been that open. Now, their strategy is very open." □

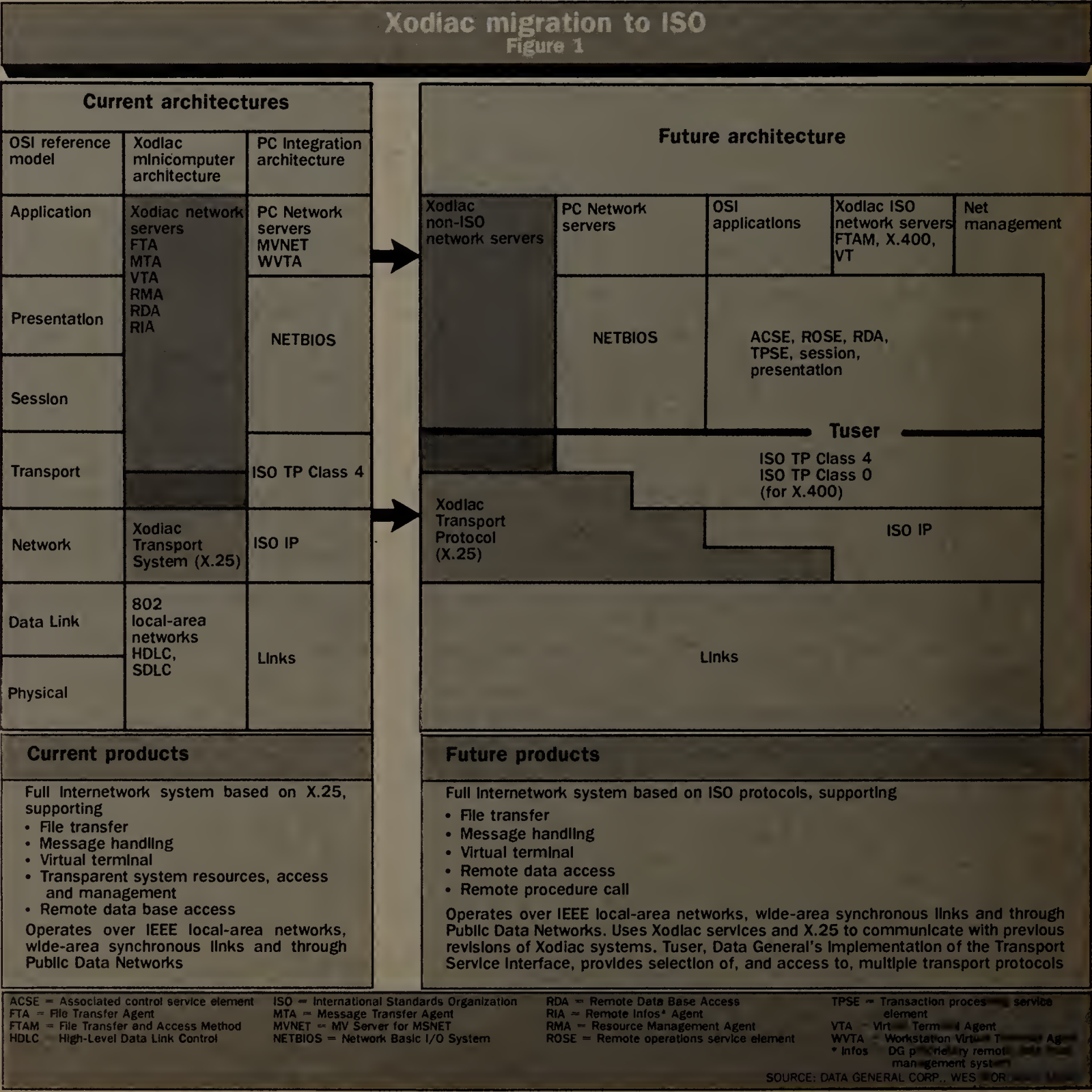
DG entered into a strategic alliance with Bridge Communications, Inc., a Mountain View, Calif., manufacturer of local-area network products based on 802.3, 802.5 and broadband technologies. The agreement calls for the two companies to jointly develop and market local-area networking equipment for DG systems.

Crook says third-party vendors can expect Data General to become increasingly communicative about publishing its specifications.

grate from 1980 specifications to 1984 specifications. This will allow DG to use Network Service Address Points for addressing.

Later, DG will replace X.25 on local-area networks with TP/IP, the ISO equivalent of TCP/IP. TP/IP now operates on PC*I. Other planned OSI connectivity projects include support for OSI Session, OSI Presentation and OSI Associated Control Service Elements, including FTAM, Virtual Terminal Survey, Remote Operations Service Element and Transaction Processing Service Element as well as Integrated Services Digital Network. The company also plans to use MS-NET as its basis for connectivity between personal computers and DG superminicomputers.

For users connecting to DEC systems, DG offers TCP/IP as well as a product called CEO Document Exchange III, which permits file swapping. DG also provides connection to Wang through CEO Doc-





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Seeking manager with extensive technical experience in IBM environment with heavy dependence on communication networks/centralized data bases. Will plan/direct County/contract staff to provide technical support for Countywide hardware, software, telecommunications and data base administration. Will also provide technical direction on procurement/installation of DP hardware/software and direct conversion from UNISYS to IBM hardware and IBM MVS/SP to MVS/XA operating system software.

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Call for a more complete information packet and application materials (resumes cannot be accepted in lieu of County application): (714) 834-2844, County of Orange Personnel Department, 10 Civic Center Plaza, Santa Ana, CA 92701. Applications must be received by 5:00 pm Friday, 10/2/87. Affirmative Action Employer M/F.

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Blue Cross/Blue Shield of New Hampshire has a current opening for a Senior Data Base Specialist in its Technical Services Department. The position exists to review and direct the design, creation, and maintenance of the Plan's Computerized Data Bases.

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The annual salary range for this position is \$50,333-56,023. If this sounds like the position for you, call (213) 62-LAUDS for an application or send your resume before September 14, 1987 to: Tom Bell, Los Angeles Unified School District, Recruitment Office, P.O. Box 2298, Los Angeles, CA 90051. Equal Opportunity Employer.



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Excellent salary/benefits. Equity incentives. Candidates should send 2 copies of resume and cover letter with salary requirements to: Box #CW-B4959, Computerworld, Box 9171, Framingham, MA 01701-9171.

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The Associate Director will be responsible for long range planning of information networking and systems integration. Expertise in the management of premise-based communications systems and mainframe communications required. Experience in dealing with AT&T and IBM product lines preferred. Computing systems background desired.

This position demands strong written and verbal communications skills, 5 to 7 years supervisory experience, 10 years related work experience, and a bachelors degree (masters preferred).

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Position MTS—Manager of Technical Services

Duties: maintaining a responsive environment for both academic and administrative computing plus managing a staff of five systems programmers. Staff responsibilities include installing, maintaining and monitoring numerous software products on both computer systems, development of equipment capacity plans and a comprehensive campus plan for telecommunications.

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Qualifications: a Bachelor's degree in computer science or a related field (a Master's degree is preferred), plus five years of experience in systems and programming development with at least three of those years in systems software (experience in VM is highly desirable); or an equivalent combination of education and experience. Ability to manage professional staff effectively also necessary.

Position MOC—Manager of Operations

Duties: overseeing the efficient operation of computing equipment and facilities for all areas within University Computing plus managing a staff of approximately fifteen computer operations, production control and data entry personnel. Staff responsibilities include scheduling and maintaining production schedules in a seven day a week, twenty-four hour a day operations environment.

Qualifications: a Bachelor's degree in computer science or a related field, plus five years of experience in computer operations and/or systems and programming development with at least one of those years in Computer Operations Management (experience with datacenter management products is highly desirable); or an equivalent combination of education and experience.

For consideration, send a letter of application, a detailed resume and names of three references to: Position MTS or MOC, P.O. Box 920—Human Resources, Eastern Michigan University, Ypsilanti, MI 48197.

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Sr. Programmer Analyst

Two positions are available for individuals to analyze and develop programs/systems and interface with users. These professionals also will develop and maintain a documentation system for all work completed.

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Data Processing

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The Bank offers an excellent salary and benefits package including medical, dental, and vision care. For consideration please send your resume and cover letter with salary requirements to: Human Resources Administrator, Dept. 4C907, Federal Home Loan Bank of San Francisco, 600 California Street, Post Office Box 7948, San Francisco, CA 94120. We are an Equal Opportunity Employer.

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Arcnet and Ethernet at bat

continued from page 17

In comparing cabling schemes, there are a few helpful tidbits of information. On the Ethernet playing field, if the cable is severed, the game is postponed due to bad weather. With Arcnet, if one of the many cables — except the one leading to the file server — is severed, only the player/workstation involved will end up confined to the injured reserve list. On the surface, the Arcnet team sounds like it could stay in the game longer than the Ethernet team, but this is not the whole story. As mentioned above, the Arcnet team plays with one ball (that is, one electronic token), which is passed around to all players. The problem is, if a single Arcnet card goes bad, the token will be destroyed. In baseball terms, that's like one of the players eating the only game ball.

The manner in which the two interface cards transfer data from the card to the bus of the workstation or file server requires some consideration. To understand the way the two teams get the job done, it's necessary to move up into the stadium bleachers. All Arcnet cards and standard Ethernet cards are currently eight-bit cards, while the Ethernet Plus card is a 16-bit card. The difference is like the two fans who order 10 hot dogs each. One fan is ambidextrous and can receive his dogs two at a time, while the other can only take his dogs one at a time. The Ethernet Plus card can transfer more data from the network to the personal computer bus than can its eight-bit counterparts.

Aside from the data bus width, the two cards behave somewhat differently in their I/O schemes. Ethernet Plus and older standard Ethernet cards use a direct memory access (DMA) interrupt to channel data from the interface card to the computer's processor. Arcnet and newer Ethernet cards, like No-

vell's Ethernet card, use "shared memory I/O" to channel data to the processor. The difference is overhead. The "shared memory I/O" fan has a blanket purchase order for hot dogs and need not negotiate the price or delivery time with the concessionaire. The "DMA" fan must request a memory interrupt and wait for the hot dog vendor to give the fan the high sign before any hot dogs change hands. The "shared memory I/O" fan merely grabs his dogs right off the broiler. The Ethernet Plus card wins the Most Valuable Player award for data transfer from network to bus. The new standard Ethernet card with the "shared memory I/O" option and the Arcnet card tie for the workstation efficiency MVP award.

One note of similarity that provides comfort to the fans of these two teams is that each of the two topologies has many vendors and manufacturers. Users of either topology can count on a long relationship with their network because there are many manufacturers from which to obtain future hardware. Aside from multiple hardware vendors, the two teams have many potential team managers in the form of different operating systems. In the '87 World Series of network hardware, the odds are pretty even. In the future, however, Ethernet will likely win the '88 and '89 network World Series if its opponent is Arcnet. With the advent of the faster 386 servers and the introduction of fiber-optic cable as a transfer medium, Ethernet networks will run far faster than any current installation. With the processing power of the 386, fiber fastballs by the Ethernet players will make transfer rates in the 100M bit/sec range attainable. Also, in a world of many standards, Ethernet has captured the hearts of all-star players such as Digital Equipment Corp., Hewlett-Packard Co., Wang Laboratories, Inc., Xerox Corp. and others. □

Beta user lauds distributed ware

continued from page 2

ledger reports.

"Currently, we're doing a lot of on-line input as far as setting up vendor files and doing our vendor coding on invoices and, without AP:Satellite, we'd be incurring charges for the prime-time computer usage," Musser said. "But with AP:Satellite, we're going to be able to download information [to microcomputers] after we run batch jobs at night and then upload that information. That will let us do our vendor setup and vendor coding on-line without incurring those charges."

According to Musser, the distributed application eliminates time lost to computer downtime. "Last night we had a problem in the computer center, and the computer was down this morning. AP:Satellite gave us the ability to download paid history information that we could use to look at paid invoices

— even though we were not on-line. It saved waiting for the microfilm or fiches. We were able to continue our work while the computer was down," Musser said.

The system also features check-writing capabilities, including real-time check generation to meet immediate needs. Musser said he had plans to use AP:Satellite as a stand-alone — without PC Link and AP:Millennium — to process hand paychecks for such things as travel expenses. "It will be a stand-alone desk only to the extent that they will be able to set up and cut checks right there. The information gathered there would then be uploaded to the mainframe at night to keep our ledger entries up to date," he said.

"We plan to buy the product after the beta test period ends," Musser said. "I see the biggest savings in mainframe usage — the fact that we'll be able to take most of our work off the prime-time shift without losing the mainframe's capabilities." □

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Produced in association with Network World.

User builds 9370 network

continued from page 1

a subsidiary of telephone giant GTE Corp. Last month, Tcom awarded the company a second contract, valued at \$2 million, for remote management of the 9370s over a five-year period.

The 9370s and an LU 6.2 application supported on them have presented no major technical problems since they began carrying customer data. But a lack of established procedures for service has taxed system resources, the network's overseers told *Network World*. "The most significant problem we've had has been attitudinal," said John Reich, senior advisory systems engineer at GTE Data Services. "We've had to educate both ourselves and our suppliers on the aspects of running a network of this nature." The mass-mail distribution application supported by the network is a time-critical one and requires 24-hour-a-day network operation.

From a field of mid-sized computers, which included IBM's own 4300 series processors, engineers at GTE Data Services selected the IBM 9373-20 running IBM's VSE/SP operating system. Reich said the company selected the 9370 because, among other things, it supports high-speed lines and because of its local net integration capabilities. The 9370 can be linked into Ethernet and token-ring local networks, capabilities Tcom needs because some printers it may wish to use cannot be channel-attached to an IBM 370-architecture machine.

The 9370's price, its ability to work in an office and support the range of printers used by Tcom were also among the factors. The 4300s, Reich said, are not hardened for dusty environments and

have disk units requiring a climate-controlled computer room.

Tcom's network hub and data center is located at GTE Data Services' headquarters in Tampa. The hub site uses an IBM 3090 mainframe running MVS/XA. Each of the 25 printing sites is served by a single 9370, as is the lone development and testing site. All the computers in the Systems Network Architecture network run VTAM telecommunications software under CICS. The network has been running in a test mode since late July.

Tcom uses the network to transmit address lists and other information needed for high-volume, first-class mailings to banks of printers at the net nodes, which are located near regional transportation hubs of the U.S. Postal Service. The promised advantages to customers are lower cost and faster delivery of bulk mail.

Currently, all connecting circuits are analog leased lines operating at up to 19.2K bit/sec using 19.2K bit/sec modems, according to Reich. "We lease from whomever we can — whoever provides the best price and serves the locations we are going to," he said. The 9370 can support lines up to 64K bit/sec, an option Tcom needs for business expansion.

Roughly 90% of the network's traffic is large outbound file transfers — print jobs to the 25 printing sites. The company is using proprietary file transfer software. "There were no good candidates on the market that work well in a hub environment with 25 sites," Reich explained. "The majority of the products on the market had limitations on how many sites they supported from a hub or in the types of file structures they handled, or there were problems with their capabilities for compressing the data they send."

Smaller amounts of data travel inbound to the hub. That traffic includes status messages and small file updates. The inbound traffic is governed by two different programs: CICS and an LU 6.2 file transfer application based on the LU 6.2 functionality in the latest release of CICS, Version 1, Release 7. (In June, IBM announced plans for a new version of VTAM that will also incorporate LU 6.2 support.) LU 6.2 support allows the 9370s to initiate file transfers to the 3090.

Managing the LU 6.2 software has not posed any major problems, Reich said. "As far as managing [LU 6.2] applications, the only real problem is that CICS is table-driven as far as the definitions for LU 6.2 communications. Keeping the tables in sync is a problem," he said.

"The only issues we've run into with LU 6.2 under CICS is that there aren't that many users of it yet, and so there have been some problems uncovered within CICS as far as error recovery. The other issue we've run into is that some of the performance tools we've used with CICS are not as robust as we'd like, as far as being able to diagnose problems or to recover from errors with an LU 6.2 transaction."

IBM's NetView is a "central piece" of the plan for managing communications with the 9370s, Reich said. NetView is now available only under MVS, not under VSE, so its use will first be restricted to the 3090 at the hub. The 9370s will run IBM's Network Communications Control Facility and Operator Communication Control Facility. The 9370 has a built-in remote operator facility, which net operators in Tampa will use for performing initial program loads, as well as hardware analysis in case of a 9370 processor failure. □

CALENDAR

Sept. 15-17, Chicago — Fundamentals of Telecommunications. Also, Oct. 26-28, Phoenix; Dec. 1-3, Chicago. Contact: ABC TeleTraining, P.O. Box 537, Geneva, Ill. 60134.

Sept. 16-17, McLean, Va. — The Management Challenge 1987. Contact: Telecommunications Managers Association of the Capital Area, c/o Bob Caine, Leo A. Daly, 1201 Connecticut Ave. N.W., Washington, D.C. 20036.

Sept. 21-22, Brussels, Belgium — IBM and DEC: A Global Perspective. Contact: International Data Corp., Attn. Diane Szretter, 5 Speen St., Framingham, Mass. 01701.

Sept. 22-24, Dallas — Ninth Annual Satellite Communications Users Conference. Contact: SCUC '87, Satellite Communications Magazine, Suite 650, 6300 S. Syracuse Way, Englewood, Colo. 80111.

Sept. 28-30, Chicago — National Communications Forum '87. Contact: National Communications Forum, Suite 4808, 505 N. Lake Shore Drive, Chicago, Ill. 60611.

Sept. 28-Oct. 3, San Diego — 25th TCA Annual Conference. Contact: TCA Annual Conference, Tele-Communications Association, 1515 W. Cameron Ave., B-140, West Covina, Calif. 91790.

Oct. 5-6, San Francisco — The Fourth Annual Third-Party Maintenance Conference. Contact: Customer Service, Frost & Sullivan, Inc., 106 Fulton St., New York, N.Y. 10038.

Oct. 5-7, Bal Harbour, Fla. — Pay Phone Expo '87 East. Contact: TeleStrategies, 1355 Beverly Road, McLean, Va. 22101.

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Oct. 12-15, Washington, D.C. — Telephone Technology and Practice. Contact: ABC TeleTraining, P.O. Box 537, Geneva, Ill. 60134.

Oct. 14-15, Newport, R.I. — The Newport Conference on Fiber-Optics Markets. Contact: Newport Conference on Fiber-Optics Markets, KMI Corp., America's Cup Ave. at 31 Bridge St., Newport, R.I. 02840.

Oct. 26-28, New York — The VAX Business User Forum. Contact: Dorothy Ferriter, IDG Conference Management Group, P.O. Box 9171, Framingham, Mass. 01701.

Oct. 27-28, New York — Unix Exposition. Contact: National Expositions Company, Inc., Suite 12A, 49 W. 38th St., New York, N.Y. 10018.

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► PRODUCT REVIEW

Topological optimization

Two new software tools help network planners optimize designs.



BY JOHN J. HUNTER
Contributing Writer

Network managers, rejoice! The hours spent poring over boring volumes of carrier tariffs to plot the cheapest routes for voice/data transmission may be over, provided your company has deep pockets. For an up-front cost in the neighborhood of \$50,000 to \$100,000, plus a stiff yearly maintenance fee, you can get a slick network design software system that'll figure out the ideal network topology employing the cheapest carriers. Of course, if they really did the job, those prices would be bargains. But the two products in this review come up short in a few areas, and one of them overlooks a vital communications facility altogether.

There are several such network design software systems on the market, and their facilities are very impressive. For example, using mathematical models, they take into account circuit topologies, network performance requirements, tariffs, special services like software-defined networks and equipment costs to provide optimized network recommendations.

Two such systems are Pathfinder from Telco Research and Computer-Aided Design Tool (CADNET) offered by General Network Corp.

Topological idealism

CADNET and Pathfinder take user-specified price/performance levels for the network and calculate the ideal topologies. To do so, they require users to enter telephone call-detail reports, performance goals, access restrictions and equipment costs.

Pathfinder employs a Telco Research-generated tariff data base to figure carrier costs, while CADNET uses McGraw-Hill, Inc.'s CCMQ-TEL 9000 national data base. Both data bases contain tariffs of the major carriers and include rates for private, toll, WATS, special access and local services rates plus inter-local access and transport area, intra-LATA, interstate and intrastate rates.

Telco Research's data base, however, omits Canadian and international tariffs. The vendor says the system will consider them when performing network calculations, but it's up to the user to furnish the numbers. If CADNET users want Canadian or other tariffs, the vendor will order them from McGraw-Hill.

CADNET systems are offered for voice- and data-only networks, but no version is available for designing integrated voice/data net-

works. Pathfinder, on the other hand, handles integrated networks, or it can be used for voice- or data-only designs. CADNET and Pathfinder run on a Digital Equipment Corp. VAX/VMS minicomputer; the voice version of Pathfinder also runs on IBM mainframes using MVS/TSO and VM/CMS operating systems.

Interactive graphics

CADNET and Pathfinder utilize interactive graphics to allow users to specify the network parameters. Both systems are menu-driven and offer on-line help facilities. Network managers and designers can evaluate major networking strategies, including private, virtual and hybrid networks, as well as compare routing strategies, multilevel switching and node placement. Planners can also institute trial network changes or "what-if" scenarios to determine how contemplated changes will affect network costs, response times, circuit availability and throughput.

Pathfinder and CADNET topological design facilities provide designers with a high-resolution map of the U.S. with state boundaries. Pathfinder offers greater detail, however, through an optional LATA boundary-definition facility. Both products also offer zoom and pan capabilities to allow users to view a particular area in detail.

Optimal aggregations

CADNET and Pathfinder generate topologies with the most cost-effective mix of long-distance services, including Megacom, Prism I, foreign exchange lines, tie lines, WATS, T-1, T-45, fiber-optic and direct dial networks.

Either system can optimize something as simple as a single location's long-distance services or as complex as networks in which end locations or nodes are completed off-network. Users can also obtain a detailed circuit-by-circuit performance analysis, cost information and routing tables for their private branch exchange.

Users must input certain information for optimal network design. Examples are the aforementioned call-detail information (obtained from PBX tapes or from the common carrier), details about loca-

tions on the network, direct inward dial ranges and trunk identifications.

The inputs are used to build traffic matrices that, in turn, are employed to generate a myriad of network scenarios. As part of the design phase, both systems evaluate the backbone network configuration and drop uneconomical circuits.

Data net design packages

Pathfinder's and CADNET's data network design packages will also construct point-to-point, multipoint, direct dial network, multiplexed, packet-switched, forced intra-LATA clustering, hybrid and switched topologies; and they will perform cost analyses for each. The user must input system parameters, site locations, transaction detail and operating constraints, such as restricting certain users to certain service levels.

Using the interactive graphics feature, which can be controlled either by a graphics terminal or mouse, users enter changes and immediately see the performance and cost impact on the network. Factors such as response times, line utilization and circuit costs are automatically recalculated. Growth factors can be applied universally or selectively by location.

Topological trade-offs

Users can also get price and performance trade-offs from either system by entering desired response-time limits, line-utilization limits, protocols (asynchronous, polled asynchronous, Systems Network Architecture/Synchronous Data Link Control, Binary Synchronous Communications and synchronous), topologies and carriers. The system performs topological trade-offs, networking pricing and performance calculations.

As mentioned earlier, both products will design networks that take into account T-1, T-45 and fiber-optic carrier facilities. Pathfinder, however, goes a big step further by taking into account AT&T's Digital Access and Cross-connect Service (DACS) facilities and Customer Controlled Reconfiguration (CCR) and by calculating their cost and performance. CADNET has no such facility, but the vendor says it will

design networks employing DACS/CCR on a custom job basis. Why not add the capability to CADNET? A company spokesman says it's under consideration.

Summary judgments

In summary, both systems provide many of the same services, but users who can afford Pathfinder's higher price will find it has the overall edge. It can be used to design integrated voice and data networks, and it takes into account advanced services such as DACS/CCR. With many companies moving their data and voice networks to T-1 facilities, the ability to calculate DACS/CCR is very important.

While CADNET and Pathfinder handle the burden of system design and cost/performance optimization, they clearly are not for everyone. Judging by the initial prices and ongoing maintenance and tariff updates, only companies with large networks that are constantly undergoing revision could justify them.

The prices shown in the accompanying table are one-time fees and, by themselves, are not that steep. CADNET, for example, costs \$25,000 for a voice or data module. CADNET users, however, also must pay between \$25,000 to \$75,000 per year, depending on the extensiveness of the tariffs chosen, for tariff updates. The \$75,000 fee, for example, includes all tariffs for all states.

Pathfinder prices shown are for the integrated voice/data network design system. Telco Research charges separately for voice and data modules; individual module prices were unavailable at press time. The yearly maintenance fee, which includes tariff updates, is set at 15% of the system's purchase price.

The final word

A final caveat: Before buying a network design system, users should try to determine how much training is required to operate the system efficiently. While any vendor, including Telco Research and General Network, will claim that features such as help screens and menu-driven packages make their system easy to learn, users should proceed carefully.

Paul Daubitz, president of Associated Telemanagement, Inc., a Boston-based consulting firm, says one of his experienced staffers needed about 50 hours to learn one leading design system. In Daubitz' opinion, the package was less complex than either Pathfinder or CADNET. Fifty hours isn't bad if a company needs to train only one person, but for large networks with multiple designers or planners, it could be a very expensive factor.■

Two net design software systems compared		
	Pathfinder	CADNET
Integrated voice/data capability	✓	
"What if" designs	✓	✓
Price	\$50K to \$250K	\$25K to \$100K

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CLEO software products allow microcomputers to communicate with mini-computers and mainframes, and to emulate their workstations. Since 1981, CLEO has provided remote communications between micros and mainframes for the automotive, insurance, medical and banking industries. Today over 44,000 CLEO users worldwide are running on all major brands of microprocessors. The greatest number of these users run CLEO software on IBM Personal Computers and NETBIOS LANs.



Complete Software/Hardware Package

Every CLEO package contains all the software and hardware accessories needed at the remote site. Your selected CLEO SNA or BSC software is packaged with 1) an internal modem card for dial-up applications, or 2) an interface card and cable for use with your existing modem. There's no waiting for non-CLEO add-ons. And, you get prompt, single-source service.



Package prices range from \$795.00 for most stand-alone packages, up to \$2,995.00 for the 32-user SNA gateway.

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CLEO Software

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